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Food Technology Abstracts

Central Food Technological Research Institute, Mysore.

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FOOD TECHNOLOGY ABSTRACTS

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ABBREVIATIONS

A	ampere
AAS	atomic absorption Spectrometry
abstr.	abstract
ad lib.	ad libitum
ADP	adenosine diphosphate
Anon.	Anonymous
AOAC	Association of Official Analytical Chemists
approx.	approximately
atm	atmosphere
ATP	adenosine triphosphate
a_w	water activity
BHA	butylated hydroxyanisole
BHT	butylated hydroxytoluene
BOD	biological oxygen demand
b.p.	boiling point
Btu	British thermal unit
c-	centi- [as in cm, cm^2, cm^3]
cal	calorie
cd	candela
Ci	curie
CMC	carboxymethyl cellulose
COD	chemical oxygen demand
coeff.	coefficient
conc.	concentrated
concn.	concentration
cv.	cultivar
cwt	hundredweight
d-	deci-
DE	dextrose equivalent
detn.	determination
DFD	dark firm dry
diam.	diameter
dil.	dilute
DM	dry matter, Deutsche Mark
DNA	deoxyribonucleic acid(s)
dyn	dyne
E.	East, Eastern, etc
ECD.	electron capture detection
EDTA	ethylenediaminetetra acetic acid
Eh	oxidation-reduction potential
ELISA	enzyme-linked immunosorbent assay
f-	femto-[10^{-15}, as in fCi]
°F	degree Fahrenheit
FAO	Food and Agricultural Organization
FDA	Food and Drug Administration
FID	flame ionization detection
fl oz	fluid ounce
f.p.	freezing point
ft	foot, feet
g	gram
GC	gas chromatography
gn	gravity
gal	gallon
gf	gram-force
GLC	gas-liquid chromatography
h	hour
ha	hectare
HDPE	high density polyethylene
hl	hectolitre [100 l]
hp	horse power
HPLC	high performance/pressure liquid chromatography
HTST	high temperature short time
Hz	hertz [frequency cycle/s]
in	inch
IR	infrared
IU	international unit
J	joule
k-	kilo- [as in kcal, kg]
K	Kelvin
l	litre
lb	pound
lb	pound-force
LDPE	low density polyethylene
m-	milli- [as in mg, ml, mm]
m-equiv	milli-equivalent
m	molar concentration
M-	mega- [as in Mrad]
max.	maximum
min	minute [time]
min.	minimum
mol	mole
mol.wt	.molecular weight
m.p.	melting point
MPN	most probable number
MS	mass-spectrometry
n-	nano-[10^{-9}, as in nm]
N	Newton [kg m/s^2]
N.	North, Northern, normal concentration
NMR	nuclear magnetic resonance
NPU	net protein utilization
oz	ounce
p-	pico- [10^{-12}, as in pCi]
P	poise
P	probability
Pa	Pascal [N/m^2]
PAGE	polyacrylamide gel electrophoresis
PER	protein efficiency ratio
p.p.b.	parts per billion
p.p.m.	parts per million
PSE	pale soft exudative
PTFE	polytetrafluorethylene
PVC	polyvinyl chloride
PVDC	polyvinylidene chloride
qt	quart
R	rontgen
rad	rad or radian
ref.	reference(s)
rev/min	revolutions per minute
RH	relative humidity
RNA	ribonucleic acid(s)
S.	south, Southern, etc.
s.d.	standard deviation
SDS	sodium dedecylsulphate
s.e.	standard error
s	second [time]
SNF	solids-not-fat
sp.,spp.	species
sp.gr.	specific gravity
summ.	summary
Suppl.	Supplement
t	metric tonne
temp.	temperature
TLC	thin layer chromatography
TS	total solids
UHT	ultra-high temperature
UV	ultraviolet
V	volt
var.	variety
vol.	volume
v/v	volume/volume
w	watt
W.	West,Western,etc.
WHO	World Health Organization
w/v	weight/volume
wk	week
wt.	weight
yd	yard
yr	year
µ	micro-[as in g, m]
%:	per centum
>	greater than
≥	greater than or equal to; not less than
<	less than
≤	less than or equal to; not greater than

Chemical symbols are used for all elements

ABBREVIATIONS FOR LANGUAGES

Language of text

Dutch	Nl
French	Fr
German	De
Italian	It
Japanese	Ja
Norwegian	No
spanish	Es
swedish	Sv

510

Hruby (J). **On the food and nutrition policy of the world.** *Ernahrungsforschung* 34(6): 1989: 179-182 (De)

The opinions on the future development of world nutrition are viewed with moderate optimism: this is supported from several directions, e.g. by prognoses of population development and food production. Undoubtedly, the world is able to feed the increasing population. The forecasts indicate a positive trend confirmed by the recent development (decreasing number of starving people, significant effect of measures taken to improve nutritional state in industrialized countries). Further consolidation of the tendencies shown is desirable and can only be achieved by permanent attention to the food problem in all countries. AS

511

Roncaglioli Vinelli (B). **Sanitary use of stainless steel in the food industry.** *Industrie Alimentari* 28(271): 1989: 496-500 (It)

The article analyses the hygienic properties of stainless steels used in contact with foodstuffs in the construction of plants, machines and tools for the food industry and in the food distribution. Legislation on materials in contact with foodstuffs is mentioned. BV

512

Hussain (RA), Poveda (LJ), Pezzuto (JM), Sejarto (DD) and Kinghorn (AD). **Sweetening agents of plant origin. Phenylpropanoid constituents of seven sweet-tasting plants.** *Economic Botany* 44(2): 1990: 174-182

Field enquiries and organoleptic tests for sweet taste led to the procurement of samples of *Piper marginatum* (dried leaves). *Tagetes filicifolia* (fresh whole plants), *Osmorhiza longistylis* (fresh roots), *Foeniculum vulgare* (fresh aerial parts), *Myrrhis odorata* (fresh whole plants), *Ocimumbasilicum* (fresh aerial parts) and *Illicium verum* (dried fruits). Follow-up lab. studies of the leaves of *Piper marginatum* demonstrated that trans-anethole (a phenylpropanoid) was the major sweet constituent of this sp. In the remaining six sp. GC/MS analysis also enabled us to demonstrate that sweetness is attributable, in each case, to the presence of high concn. of the phenylpropanoids, trans-anethole and estragole, either alone or in combinations. AS

513

Nelson (PE). **Aseptic bulk processing of fruits and vegetables.** *Food Technology* 44(2): 1990: 96, 101

Review. 13 references. BV

514

Wijaya (CH), Nishimura (H), Tanaka (T) and Mizutani (J). **Influence of drying methods on volatile sulphur constituents of caucas** (*Allium victorialis L.*). *Journal of Food Science* 56(1): 1991: 72-75

515

Chao (RR), Mulvaney (SJ), Sanson (DR), Hsieh (F-H) and Tempesta (MS). **Supercritical carbon dioxide extraction of annatto** (*Bixa orellana*) **pigments and some characteristics of the colour extracts.** *Journal of Food Science* 56(1): 1991: 80-83

Supercritical carbon dioxide (SC-carbon dioxide) was used to extract natural food colours from annatto (*Bixa orellana*) seeds with different pressures and temp. Results from the reverse thin-layer chromatographic separation and GC/MS revealed that SC-carbon dioxide extracts were composed mainly of bixin, geranylgeraniol and norbixin. Differences in absolute values of solubility parameters (SPD) between these main compounds and SC-carbon dioxide indicated bixin was more easily extracted than norbixin under conditions used. A higher yield of total pigments was obtained at extraction pressure above 310 bar than at 210 bar and 50 C. AS

FOOD PACKAGING

516

Ostermann (AE) and Lorenz (G). **Juice quality and carton packaging. New test results for the evaluation of some important parameters.** *Fluessiges Obst* 55(9): 1988: 479-480

This article describes the quality level of todays orange juice packages. Different packaging materials are discussed with reference to influence on juice, vitamin C decomposition. A comparison between carton packages and glass containers is also discussed. BV

Aseptic packaging

517

Prahlad (SN). **Aseptic packaging-Consumer packs.** *Indian Dairyman* 42(8): 1990: 331-339

Aspects covered in this article are the concept of aseptic packaging (commercial sterility, enzyme inactivation, quasi aseptic), aseptic packaging for tropical fruit and conc., how does aseptic system work, limitations, the bag-in-box packaging system and its history, bags, fillers, machine functions, filling technology and bag-in-box and the environment. SRA

FOOD ENGINEERING AND EQUIPMENT

Engineering

518

Mulvaney (SJ), Rizvi (SSH) and Johnson (CR). **Dynamic modeling and computer control of a retort for thermal processing.** *Journal of Food Engineering* 11(4): 1990: 273-289

The process dynamics and evaluation of analog pneumatic control and digital control of a batch retort were studied. Sensor dynamics of the analog controller resulted in poor control for arbitrary set-point tracking of the retort temp. The retort dynamics were determined to be nonlinear in terms of the process gain, and time constant for changes in the steam supply input. A model was developed to describe this behaviour and a digital proportional-integral controller was designed from simulation studies. This controller, with an anti-windup feature, was an excellent controller for regulation of the retort temp. to within plus or minus 0.1 C. It was also shown that to maintain this level of control the controller parameters need to be scheduled according to steam supply conditions and processing set-point. AS

519

Deniston (MF), Kimball (RN), Pedersen (LD), Gee (M), Parkinson (KS), Jones (HC). **Effects of steam/air mixtures on a convection-heating product processed in a steritort.** *Journal of Food Science* 56(1): 1991: 27-30

Effects of residual air were evaluated on the heating rates of a convection-heating product processed in a continuous rotary sterilizer. Heat penetration tests were conducted in a steritort at various reel speeds(1-10 rpm) and air overpressures (0-69.0KPa) using 211 x 300, 300 x 407 and 603 x 700 cans containing Washington white beans in brine. Sterilization times calculated by Ball's formula method were longer for test cans processed with overpressure than those processed with no overpressure. Max. reduction in calculated lethality for 69.0 kPa air overpressure was 15.2% for 211 x 300 and 300 x,407 exp. and 49.4% for 603 x 700 exp. For each can size and reel speed, av. process time was a linear function of overpressure. AS

ENERGY IN FOOD PROCESSING

Nil

FOOD CHEMISTRY AND ANALYSIS

Chemistry

520

Matsui (T), Mizumoto (S), Kotani (A), Imakura (H), Shimode (M), Osajima (Y). **Depression of sorption of volatile compounds into EVA film by electron beam irradiation.** *Journal of the Science of Food and Agriculture* 50(4): 1990: 507-515

Decrease in solubility of volatile compounds (octan-1-ol octanal, ethyl hexanoate, octane and d-limonene) into a film liner was studied after electron beam irradiation up to 20 Mrad of ethylene vinyl acetate copolymer (EVA) film. The solubility coeff. decreased gradually during aging despite no change immediately after the irradiation. In all films dosed with 5-230 Mrad the sorption was depressed about 40% in comparison with the unirradiated one after 54 months. The behaviour was consistent with that of the decay of the radicals in the films. The enthalpy change in sorption (δ H) was -18.0 KJ mol^{-1} for 5 Mrad ethylene vinyl acetate copolymer film compared with -48.1 KJ mol^{-1} for the unirradiated one. In a homologous series, sorption was significantly depresed with increasing carbon chain length of the volatile compound. The specific sorption depression effect was observed for low polarity compounds such as hydrocarbons, aliphatic esters and d-limonene. The diffusion coeff. of the sorbed compounds increased about 1.6 times after 3 months when irradiated to 20 Mrad. AS

521

Hsieh (YP) and Harris (ND). **Destructive effect of aspartame on ascorbic acid in Cu-catalyzed solutions.** *Journal of Food Science* 56(1): 1991: 14-16, 20

The effect of aspartame on the early stage of ascorbic acid (AA) oxidation in solutions was studied by measuring AA retention in an open system at 30 C and the oxygen uptake in a closed system at 33 C. Comparisons were also made between aspartame (0.06% and 0.12%) and sucrose (10% and 20%) in Cu-catalyzed and noncatalyzed solutions at 30 C. Copper activity in aspartame solution was measured by using a cupric ion selective electrode. Aspartame increased the rate of AA oxidation in all tested solutions. In the presence of Cu the oxidation rate of AA was significantly higher in aspartame solutions than in sucrose solutions despite the fact

that aspartame showed Cu-complex capacity in solution. AS

522

Bell (LN) and Labuza (TP). **Aspartame degradation kinetics as affected by pH in intermediate and low moisture food systems.** *Journal of Food Science* 56(1): 1991: 17-20

Kinetics of aspartame degradation in low to intermediate moisture systems were evaluated by incorporating aspartame into agar/microcrystalline cellulose model systems. They were prepared at pH 3, 5, and 7, equilibrated after freeze-drying to three water activities (0.34, 0.56, and 0.66), and stored at 25 to 45 C. Aspartame in such systems was most stable at pH 5 and became less stable as pH decreased or increased. As the molar buffer salt concn. increased, the rate of aspartame degradation increased. The activation energy ranged from 23 to 36 kcal/mole. AS

Chemistry(Analytical)

523

Prakash (S). **Differentiation between food grade and non-food grade mineral hydrocarbons by thin layer chromatography.** *Journal of the Association of Public Analyst* 27(3): 1989: 109-112

The blue flouresence test for the detection of polycyclic aromatic hydrocarbons (PAH's) using a long wave UV lamp, after thin layer chromatography on a silica gel G plate, can be used to differenciate between food grade and non-food grade mineral hydrocarbons. Method is suggested for routine analysis. SRA

524

Vaessen (HAMG) and van de Kamp (CG). **Reference-material-based collaborative test of flame atomic absorption spectroscopic determination of calcium and magnesium in foods and biological materials.** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 190(3): 1990: 199-204

525

Kaphalia (BS), Takroo (R), Mehrotra (S), Usha Nigam and Seth (TD). **Organochlorine pesticide residues in different Indian cereals, pulses, spices, vegetables, fruits, milk, butter, deshi ghee, and edible oils.** *Journal of the Association of Official Analytical Chemists* 73(4): 1990: 509-512

A total of 244 samples of cereals (wheat flour, rice and maize) pulses (arhar, moong, gram, lentil, and black gram), spices (turmeric, chilli, coriander, and black pepper), vegetables (potato, onion, spinach, cabbage, brinjal, and tomato), fruits (mango, guava, apple, and grape), milk, butter, Deshi ghee, and edible oils (vegetable, mustard, groundnut and sesame) collected from different cities of Northern Province (Utter Pradesh) were analyzed by GLC for the presence of organochlorine pesticide residues. Residues of hexachlorocyclohexane (HCH) and 2,2-bis(p-chlorophenyl)-1 1,1-trichloroethane (DDT) were detected in about 85% of the total samples of cereals, spices, milk, butter, Deshi ghee, and edible oils were analyzed in the present study. However, the residue levels were either very small (0.06 p.p.m.) or not detected at all in pulses, vegetables, and fruits as compared with very high concn. in wheat flour (4.,42 and 0.12 p.p.m.), butter (1.19 and 4.85 p.p.m.) mustard oil (1.26 anbd 2.42 p.p.m.), Deshi ghee (1.10 and 3.84 p.p.m.), vegetable oil (1.02 and 0.59 p.p.m.) groundnut oil (0.51 and 1.49 p.p.m.), and chilli (0.48 and 1.92 p.p.m.). The levels of HCH and DDT residues detected in rice, maize, turmeric, coriander, black pepper, and all the vegetables and fruits were also lower than those found in wheat flour, oil, and at samples analyzed in the present study. These findings suggest that a restricted and controlled use of such persistent pesticides may be useful for decreasing their contamination levels in different food items. AS

526

Brune (M), Hallberg (L) and Skanberg (A-B). **Determination of iron-binding phenolic groups in foods.** *Journal of Food Science* 56(1): 1991: 128-131, 167

A spectrophotometric assay was developed with the specific aim of determining the content in foods of iron-binding phenolic compounds. Foods were extracted with dimethylformamide (50%) and an iron-containing reagent was added. The resulting colour was due to formation of Fe-galloyl and Fe-catechol complexes. These complexes had different absorbance maxima and could thus be separately determined by readings at two wavelengths. The method was simple and had good precision, accuracy and analytical recovery. The new method was compared with two commonly used methods for detn. of phenolic content in cereals, fruits, vegetables, spices and beverages. AS

FOOD MICROBIOLOGY AND HYGIENE

Enzymes

527

Kautola (H). **Itaconic acid production from xylose in repeated batch and continuous bioreaction.** *Applied Microbiology and Biotechnology* 33(1): 1990: 7-11

Itaconic acid production from xylose by immobilized *Aspergillus terreus* TKK 200-5-2 mycelia was optimized both in repeated shake-flask fermentations and in continuous column bioreactors using statistical experimental design and empirical modelling. Using continuous 9-1 scale air-lift bioreactors, a pH of 2.5, aeration rate of 0.6 v/v per min and residence time of 160 h gave the highest itaconic acid concn. In air-lift bioreactors a cubic carrier size of 0.5 cm gave a 3.3 fold higher product concn. than 1 cm cubes. Packed-bed column reactors had a higher producing rate than air-lift reactors. AS

528

Markl (H), Lechner (M) and Gotz (F). **A new dialysis fermentor for the production of high concentrations of extracellular enzymes.** *Journal of Fermentation Technology (Hakko Kogaku Zasshi)* 69(4): 1990: 244-249

A new single-vessel dialysis fermentor is presented, which can be sterilized *in situ* and handled like the usual standard fermentors. The reactor is recommended for the production of high concn. of extracellular enzymes. This is done in such a manner that the products are not spoiled through contact with the crude components of technical nutrient solutions. The reactors has been tested for the production of lipase with a culture of *Staphylococcus carnosus*. Sixty g l^{-1} of cellular dry mass and 227 mg l^{-1} lipase were produced within 46 h, using a continuously renewed high concn. of substrate. For planning the exp. and for the development of an optimal operation strategy, a mathematical model of the dialysis reactor system proved to be very helpful. The membrane permeability coeff. found for the limiting fraction of the yeast extract peptone medium corresponds to a mol. wt. between 300 and 400. AS

529

Baeza (G), Correa (D) and Salas (C). **Proteolytic enzymes in** *Carica candamarcensis*. *Journal of the Science of Food and Agriculture* 51(1): 1990: 1-9

Ethyl alcohol

530

Christakopoulos (P), Macris (BJ) and Kekos (D). **On the mechanism of direct conversion of cellulose to ethanol by** *Fusarium oxysporum*. **Effect of cellulose and β-glucosidase.** *Applied Microbiology and Biotechnology* 33(1): 1990: 18-20

The effects of the three main enzymes involved in cellulose saccharification, namely cellobiohydrolase, carboxymethylcellulase and β-glucosidase, on the direct conversion of cellulose to ethanol by *Fusarium oxysporum* F3 were investigated. Ethanol production was not affected when the activity of the former two enzymes was varied within a wide range. By contrast, β-glucosidase markedly affected ethanol production showing an optimum level of 0.7-09.8 unit/ml growth medium. A significant decrease of cellulose bioconversion time to ethanol was obtained when β-glucosidase activity was adjusted to this optimal level at the beginning of the fermentation process. AS

531

Oderinde (RA), Okogun (JI) and Esuoso (KO). **The influence of CDTA and DETA on ethanol production from sugar cane molasses using** *Saccharomyces cerevisiae*. *Die Nahrung* 34(2): 1990: 171-175

Effects of complexing agents on the sensitivity of ethanol production using *Sacch. cerevisiae* were investigated using trans-1-2,diamino-cyclohexane-N,N,N',N'-tetraacetic acid (CDTA) and diethylene triamine pentaacetic acid (DPTA). Addition of 600 p.p.m. CDTA during inoculation produces a max. stimulation: ethanol production at this concn. was 1.5% (v/v) more than the control cultures (-6%). 1000 p.p.m. CDTA produces max. effect during propagation which was 2.3% more than the control cultures. When DPTA was introduced during inoculation, 800 p.p.m. DPTA produces a max. effect, which was 2.9% more than the control cultures. 200 p.p.m. DPTA produces a max. stimulatory effect of 1.0% more than the control cultures. No significant effect was observed when DPTA was added during fermentation but 700 p.p.m. CDTA increased ethanol production by 1.3% more than the control cultures. AS

Microorganisms

532

Gervais (P). **Water activity. A fundamental parameter of aroma production by microorganisms.** *Applied Microbiology and Biotechnology* 33(1): 1990: 72-75

The water activity of the medium, which is analogous to osmotic pressure in liquid medium, is a fundamental parameter for the mass transfer of water and solutes across the cell membrane. The control of this parameter could be used to modify the metabolic production or excretion of a microorganism, as demonstrated in this work for aroma production by a fungus and a yeast. AS

Bacteria

533

Tracey (RP) and Britz (TJ). **Freon 11 extraction of volatile metabolites formed by certain lactic acid bacteria.** *Applied and Environmental Microbiology* 55(6): 1989: 1617-1623

The volatile metabolites formed by 18 lactic acid bacteria, representing three genera, were extracted from a complex medium by using a Freon 11 extraction method. The Freon extracts were then analyzed by capillary gas chromatography, and certain were analyzed by gas chromatography-mass spectrometry. A total of 35 major peaks, of which 20 were positively identified, were used to differentiate between the various strains. On the basis of the results obtained, it was possible to differentiate between the members of the genera *Lactobacillus*, *Pediococcus*, and *Leuconostoc*, as well as between various sp. within the genus *Leuconostoc*. Of the 10 *Leuconostoc oenos* strains included in this study, 9 yielded similar results, but it was still possible to differentiate between the various strains. *L. oenos* B66 differed from the other *L. oenos* strains. Use of the Freon 11 extraction technique to determine volatile metabolites formed by lactic acid bacteria was shown to be highly reproducible and of great value. Furthermore, certain compounds not previously known to be formed by lactic acid bacteria were found. AS

534

Montgomery (AD), McInerney (MJ) and Sublette (KL). **Microbial control of the production of hydrogen sulphide by sulphate reducing bacteria.** *Biotechnology and Bioengineering* 35(5): 1990: 533-539

A sulphide-resistant strain of *Thiobacillus denitrificans*, strain, F, prevented the accumulation of sulphide by *Desulfovibrio desulfuricans* when both organisms were grown in liquid medium or in Berea sandstone cores. The wild-type strain of *T. denitrificans* did not prevent the accumulation of sulphide produced by *D. desulfuricans*. Strain F also prevented the accumulation of sulphide by a mixed population of sulphate-reducing bacteria enriched from an oil field brine. Fermentation balances showed that strain F stoichiometrically oxidized the sulphide produced by *D. desulfuricans* and the oil field brine enrichment to sulphate. These data suggest that strain F would be effective in controlling sulphide production in oil reservoirs and other environments. AS

Aeromonas hydrophila

535

Golden (DA), Eyles (MJ) and Beuchat (LR). **Influence of modified-atmosphere storage on the growth of uninjured and heat-injured** *Aeromonas hydrophila*. *Applied and Environmental Microbiology* 55(11): 1989: 3012-3015

The growth of uninjured and heat-injured *Aeromonas hydrophila* incubated at 5 C (22 days) and 30 C (31 h) under air, N, carbon dioxide was investigated. At 30 C, the growth patterns of cells on brain heart infusion agar incubated under air and N were similar, although slight differences in the lengths of the lag phases and the final populations were detected. The lag phases of cells incubated under air and N were substantially longer at 5 C than at 30 C. The population of uninjured *A. hydrophila* incubated at 5 C under air and N remained constant, whereas the number of injured cells declined before the exponential growth phase. Growth at 5 C was enhanced when uninjured and heat-injured *A. hydrophila* were incubated under N, at 30 C, cells incubated under carbon dioxide exhibited noticeably longer lag phases and lower growth rates than did cells incubated under air and N. The viable populations of uninjured and heat-injured cells incubated at 5 C under carbon dioxide declined steadily throughout incubation. AS

Bacillus

536

Pendurkar (SH) and Kulkarni (PR). **Heat resistance of *Bacillus* spores exposed to food processing conditions.** *Die Nahrung* 34 (2): 1990: 177-180

The heat resistance of the spores of 5 *Bacillus* sp. was studied in distilled water and pasteurized skim milk. The spores were also subjected to frying and cooking conditions used in fried rice preparations. In presence of milk, the heat resistance of all the 5 *Bacillus* sp. was found to decrease compared to distilled water. Spores of all 5 *Bacillus* survived cooking conditions of rice. Frying and subsequent cooking conditions inactivated the spores of all 5 *Bacillus* sp. AS

Bifidobacteria

537

Modler (HW), Mckellar (RC) and Yaguchi (M). **Bifidobacteria and bifidogenic factors.** *Canadian Institute of Food Science and Technology Journal* 23(1): 1990: 29-41

Bifidobacterium pseudolongum

538

Rao (AV), Shiwanarain (N) and Maharaj (I). **Survival of microencapsulated** *Bifidobacterium pseudolongum* **in simulated gastric and intestinal juices.** *Canadian Institute of Food Science and Technology Journal* 22(4): 1989: 345-249

A preliminary procedure for the microencapsulation of bifidobacteria with cellulose acetate phthalate (CAP), using phase separation-coacervation was developed. *In vitro* studies were conducted on microencapsulated *Bifidobacterium pseudolongum*, to determine the effect of gastric and intestinal pH on the release of the bacteria by sequential incubation in simulated gastric and intestinal juices, without enzymes. Microbiological analyses indicated that microencapsulated *B. pseudolongum* survived the simulated gastric environment in larger numbers than non-encapsulated *B. pseudolongum*. AS

Botrytis cinerae

539

Pielken (P), Stahmann (P) and Sahm (H). **Increase in glucan formation by** *Botrytis cinerae* **and analysis of the adherent glucan.** *Applied Microbiology and Biotechnology* 33(1): 1990: 1-6

Glucan production by *Botrytis cinerea* increased from 1 g/l to 3 g /l when potassium nitrite placed asparagine as the nitrogen source. A further enhancement up to 5 g/l was obtained with nitrogen-limited medium or non-growing cells. Under these conditions an extracellular glucan layer was attached to the mycelium. The adherent glucan made up 60% of the total amount of glucan produced and thus increased the total glucan yield to 13 g/l. An enzymatic analysis of the adherent glucan indicated that only about every fifth molecule of the main chain was substituted by a glucose unit. In contrast, in the free glucan of culture filtrates glucose units were distributed at approx. every second to third residue of the main chain. AS

Clostridium

540

Yamamoto (Y), Imaizumi (W), Higashi (K) and Yoshii (H). **Effects of organic acids on thermal resistance of** *Clostridium* **spores.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 37(3): 1990: 199-202 (Ja)

Effects of various organic acids on thermal resistance of spores of *Clostridium botulinum* 62 A in 213 B, *Clostridium sporogenes* PA 3679 and *Clostridium perfringens* JCM 01382 were investigated. Thermal resistance of all the tested *Clostridium* spores was max. at pH 7.0 and it decreased with increasing acidity or alkanity. In particular, it was remarkable in acidic side. The addition of 0.2-0.5% adipic acid at pH 5.5.- 9.0 decreased thermal resistance of spores with increasing concn. of adipic acid. Decreases of thermal resistance of *C. boutlinum* and *C. perfringens* spores by addition of adipic acid were almost not affected by pH. However, that of *C. sporogenes* spores increased as pH dropped. The addition of 0.2% of acetic, adipic, lactic, malic, citric, fumaric, gluconic, tartaric, succinic, sorbic or propionic acid at pH 7.0 and 9.0 decreased thermal resistance of *C. botulinum* 62 A spore by 35-65%. At pH 5.5, the decreasing actions of most of the tested organic acids on thermal resistance of *C. botulinum* 62 A spores were significantly reduced or disappeared, although those of adipic and acetic acid were powerful. AS

Lactobacillus

541

Lin (SY), Ayres (JW), Winkler (WJr) and Sandine (WE). *Lactobacillus* **effects on cholesterol. In vitro and in vivo results.** *Journal of Dairy Science* 72(11): 1989: 2885-2899

A double blind investigation was conducted on the influence of a commercially available tablet containing *Lactobacillus bulgaricus* and *Lactobacillus acidophilus* on human serum lipoprotein concn. in 354 individuals. The results were statistically evaluated and found to be reliable. The ingestion of commercially available *Lactobacillus* tablets, which contain about $2+10^6$ cfu/tablet of *L. acidophilus* and *L. bulgaricus* cells in a dose of four tablets daily did not affect serum lipoprotein concn. JSS

Lactobacillus bulgaricus

542

Weimer (BC), Oberg (CJ), Moyes (LV), Brown (RJ) and Richardson (GH). **Comparison of classical ion exchange amino acid analysis and O-phthaldialdehyde, methods to characterize proteolysis by** *Lactobacillus bulgaricus*. *Journal of Dairy Science* 72(11): 1989: 2873-2876

Seven strains of *Lactobacillus bulgaricus* were assayed for proteolytic activity using o-phthaldialdehyde and classical ion exchange amino acid analysis. The strains were ranked in the same order of proteolysis by both methods. Linear

regressions of total and individual amino acid concn., except for alanine and glycine, were correlated with o-phthaldialdehyde results (R^2 = .95). The mean coeff. of variation was 7.3% for amino acid analysis and 10.2% for o-phthaldialdehyde. The o-phthaldialdehyde method was comparable to amino acid analysis for measuring gross proteolysis, but amino acid analysis provides additional information. AS

Lactococcus lactis

543

Laan (H) and Konings (WN). **Mechanism of proteinase release from** *Lactococcus lactis* **subsp.** *Cremoris* **Wg 2.** *Applied and Environmental Microbiology* 55(12): 1989: 3101-3106

The procedure generally used for the isolation of extracellular, cell-associated proteinases of *Lactococcus lactis* sp. is based on the release of the proteinases by repeated incubation and washing of the cells in a Ca^{2+} free buffer. For *L. lactis* subsp. *cremoris* Wg2, as many as five incubations for 30 min at 29 C are needed in order to liberate 95% of the proteinase. Proteinase release was not affected by chloramphenicol, which indicates that release is not the result of protein synthesis during the incubations. Ca_{2+}inhibited, while ethyiene glycol-bis (β-aminoethyl ether)-N,N,N',N'-tetraacetic acid (EGTA) stimulated, proteinase release from the cells. The pH optimum for proteinase release ranged between 6.5 and 7.5, which was higher than the optimum pH of the proteinase measured for casein hydrolysis (i.e. 6.4). Treatment of cells with the serine proteinase inhibitor phenylmethylsulfonyl fluoride prior to the incubations in Ca^{2+} free buffer reduced the release of the proteinase by 70 to 80%. The residual proteinase remained cell associated but could be removed by the addition of active *L. lactis* subsp. *cremoris* Wg2 proteinase. This suggests that proteinase release for cells of *L. lactis* subsp *cremoris* Wg2 is the result of autoproteolytic activity. From a comparison of the N-terminal amino acid sequence of the released proteinase with the complete amino acid sequence determined from the nucleotide sequence of the proteinase gene, a protein of 180 Kilodaltons would be expected. However, a proteinase with a mol. wt. of 165,000 was found, which indicated that further hydrolysis had occurred at the C terminus. AS

Listeria monocytogenes

544

Cassiday (PK), Brackett (RE) and Beuchat (LR). **Evaluation of three newly developed direct plating media to enumerate** *Listeria monocytogenes* **in foods.** *Applied and Environmental Microbiology* 55(6): 1989: 1645-1648

LiCl-phenylethanol-moxalactam Agar (LPMA), ARS Modified McNBride Agar, and Modified Vogel Johnson Agar were compared with previously tested plating media in the enumeration of *Listeria monocytogenes* from pasteurized whole milk, chocolate ice cream mix, Brie cheese, and raw cabbage. LPMA was most suitable for analyzing Brie cheese and cabbage. Gum base-nalidixic acid tryptone-soy medium (previously tested) was most suitable for analyzing milk and chocolate ice cream mix. AS

545

Siragusa (GR) and Johnson (MG). **Inhibitions of** *Listeria monocytogenes* **growth by the lactoperoxidase thiocynate hydrogen peroxide antimicrobial system.** *Applied and Environmental Microbiology* 55(11): 1989: 2802-2805

The lactoperoxidase-thiocyanate hydrogen peroxide system (LP system), consisting of lactoperoxidase (0.37 U/ml), KSCN (0.3 mM) and hydrogen peroxide (0.3 mM), delayed but did not prevent growth of *L. monocytogenes* Scott A at 5, 10, 20, and 30 C in broth and at 20 C in milk. The net lag periods determined spectrophotometrically varied inversely with temp. and were shorter at 5 and 10 C for cultures from shaken versus from statistically grown inocula. Lag periods for cultures from shaken and statistically grown inocula, resp, were 73 and 98 h at 5 C, 22 and 32 h at 10 C, both 8.9 h at 20 C, and both 2.8 h at 30 C. After the lag periods, the max. specific growth rates were similar for each of the three treatments (complete LP system, hydrogen peroxide, alone, or control broth) at 5, 10 and 20 C and and were 0.06 to 0.08, 0.09 to 0.1, and 0.32 to 0.36/h resp. At 20 C in sterile reconstituted skim milk, the LP system, restricted growth of Scott A, with log CFU counts per ml at 0, 36, and 68 h being 5.7, 65.4 and 7.9 (versus 5.7, 9.8, and 11.2 controls). Possible explainations for the decreased lag times observed for cultures from aerobically grown inocula are discussed. AS

Salmonella typhimurium

546

Schuman (JD), Zottola (EA) and Harlander (SK). **Preliminary characterization of a food-borne multiple antibiotic resistant** *Salmonella typhimurium* **strain.** *Applied and Environmental Microbiology* 55(9): 1989: 2344-2348

Plasmid characterization studies were conducted on a *Salmonella typhimurium* strain isolated from pasteurized milk and from a symptomatic patient during the 1985 Illinois salmonellosis outbreak.

This strain (III) was reported to possess an unusual plasmid profile which distinguished it from all *Salmonella* strains isolated in the United States prior to 1984. Antibiotic susceptibility testing revealed that the strain was resistant to tetracycline, erythromycin, clindamycin, sulfisoxazole, sulfadiazene, triple sulfa, cefoperazone, streptomycin, mezlocillin, piperacillin, carbenicillin, penicillin, ampicillin, and kanamycin. Plasmid analysis revealed that the strain possessed four plasmids with size of approx. 158, 98, 10.2, and 6.0 kilobase pairs (kb). Successive transfer at 43 C led to increased antibiotic sensitivity in 75.5% of the isolates screened. Electroporation and calcium chloride treatment were each used to transform plasmid free *Escherichia coli* form 4.4 to 23.2 kb and correlated with resistance to penicillin G, ampicillin, carbenicillin, cephalothin, cefoperazone, cefamandole, mezlocillin, piperaceillin, and in some cases, tetracycline and kanamycin. DNA-DNA hybridization exp. localized these resistance genes to a highly duplicated 6.3 kb fragment of the total EcoRI restriction digest of the S. *typhimurium* H plasmid pool. AS

Fungi

Mushrooms

547

Senatore (F). **Fatty acid and free amino acid content of some mushrooms.** *Journal of the Science of Food and Agriculture* 51(1); 1990; 91-96

Free amino acids and fatty acids of 7 Basidiomycetes belonging to the families Hygrophoraceae and Russulaceae were determined. Pro, Glu, Ser and Val. are the main free amino acids. Linoleic, oleic and palmitic acids are essentially the only fatty acids. AS

548

Flurkey (WH). **Identification of tyrosinase in mushrooms by isoelectric focusing.** *Journal of Food Science* 56(1); 1991; 93-95

Isoenzymes of tyrosinase were identified in mushrooms using vertical polyacrylamide gel isoelectric focussing in conjunction with a pH 4-7 gradient. The M2, M8, and M9 strains of *Agaricus* could be distinguished by differences in lower pI isoenzyme forms around pH 4. In the M8 strain, the epidermis, cap flesh, gill, and stalk tissue showed similar isoenzyme after isoelectric focusing, but the distribution of staining intensity appeared different for each type tissue. Younger developmental stages of M8 mushrooms showed a different isoenzyme profile than older ones. Mature mushrooms cut at the stipe showed a different distribution of isoenzyme staining than those not cut at the stipe, indicating possible activation of latent enzyme or new synthesis of specific tyrosinase isoenzymes. AS

Yeasts

549

Amata (IA) and Germain (P). **The effect of pitching yeast aeration on the production of acetic acid during fermentations with brewers yeasts. An enzymic approach.** *Journal of the Institute of Brewing* 96(3); 1990; 131-134

Aeration of pitching yeast significantly increases the metabolism of acetate. This increase is particularly noticed at an enzymatic level, with special reference to the specific activity of the Fe_{+++}linked pyruvate de-carboxylase which has been shown to be involved in the production of acetic acid. At the beginning of fermentations carried out with aerobic and anaerobic pitching yeasts, an increase in acetic acid production is observed, this is followed by reabsorption. Stabilisation in the concn. of acetic acid is observed until the end of fermentation. Initial and final concn. of acetic acid obtained during fermentations were significantly higher in fermentations carried out with aerobic pitching yeasts than in fermentations carried out with anerobic pitching yeasts. AS

550

Torok (T) and King (ADJr). **Thermal inactivation kinetics of food-borne yeasts.** *Journal of Food Science* 56(1); 1991; 6-9, 59

The thermal inactivation kinetics of three food-borne yeasts from heat-treated products-two *Sacch. cerevisiae* and one *Zygosacch. rouxii*-have been determined. Thermal treatment and evaluation of results were carried out according to the dynamic heat destruction method. Results for 0.5% (w/w) glucose as heating medium expressed in D_{55} values were 1.05, 2.67 and 0.16 min, respectively. The respective z values were 4.00, 6.23 and 5.55 C. The apparent activation energy for heat destruction calculated from the Arrhenius plot for the 3 yeasts were 5.05×10^5, 3.61×10^5 and 3.60×10^5 $Jmol^{-1}$. Applying Eyring's theory of absolute reaction rates for thermal destruction, values for enthalpy and entropy of activation could be calculated. AS

Aplotrichum curvatum

551

Ykema (A), Verbree (EC), Verwoerb (IGS), Vander Linden (KH), Nijkamp (HJJ), Smit (H). **Lipid production of revertants of Ufa mutants from the oleaginous yeast** *Aplotrichum curvatum*. *Applied*

Microbiology and Biotechnology 33(2): 1990: 176-182

From 6 unsaturated fatty acid auxotrophs (Ufa mutants) of the oleaginous yeast *Aplotrichum curvatum* blocked in the conversion of stearic to oleic acid, were isolated revertants able to grow in the absence of unsaturated fatty acids, in a search for strains that can produce cocoa butter equivalents. A broad range in the percentage of saturated fatty acids (%SFA) was observed in the lipids of individual revertants (varying from 37% - 86% SFA), compared with the wild-type (44% SFA). Further analysis of fatty acid comp. indicated that: (i) not all six Ufa mutants had the same genetic background and (ii) one specific Ufa mutation could be reverted in more than one way. Revertants that produced lipids with a %SFA 56%, were examined further. These strains were cultivated for 50 generations and half of them produced lipids with high %SFA after that time and were defined as stable. The viability of revertant strains with extremely high %SFA (80%) may be explained by our finding that polar lipids, which are part of yeast membranes, contained much more polyunsaturated fatty acids and a significantly lower %SFA than neutral (storage) lipids. One revertant (R25.75) was selected that was able to produce lipids in whey permeate at a rate comparable with wild-type. *A. curvatum* and with a fatty acid comp. and congelation curve comparable with cocoa butter. AS

Baker's yeast

552

Oda (Y) and Ouchi (K). **Principal-component analysis of the characteristics desirable in baker's yeasts.** *Applied and Environmental Microbiology* 55(6): 1989: 1495-1499

Twenty seven properties considered to be required for good bakery products were examined in 56 industrial and 2 lab. yeast strains. The data obtained were applied to principal-component analysis, one of the multivariate statistical analyses. The first and second principal components together were extracted, and these accounted for 77.7% of the variance. The first principal component was interpreted as the glycolytic activity of yeast in dough, and the second one was interpreted as the balance of leaving abilities in sweet and flour doughs from the factor loadings. The scattergram on the two principal components was effective in grouping the 58 yeast strains used. AS

553

Abulesz (E-M) and Lyberatos (G). **Periodic operation of a continuous culture of baker's yeast.** *Biotechnology and Bioengineering* 34(6): 1989: 741-749

The possibility of enhancing the biomass productivity of a continuous culture of *Saccharomyces cerevisiae* growing on a glucose-limited medium is addressed. An unstructured Monod-type model is first identified using steady-state data. The culture is subjected to stop changes in dilution rate, and it is seen that the Monod model is unable to predict even qualitatively the dynamic response of the culture. Incorporation of a time delay allows significant improvement in the transient fit. It is found that the culture has a time lag of about 3 h in adapting its growth rate. Cycling the dilution rate with a period of 3 h leads to substantial improvement in the average biomass productivity. AS

Zygosaccharomyces rouxii

554

Van zyl (PJ) and Prior (BA). **Water relations of polyol accumulation by** *Zygosaccharomyces rouxii* **in continuous culture.** *Applied Microbiology and Biotechnology* 33(1): 1990: 12-17

Glycerol and arabitol were the main polyols accumulated. *Zygosaccharomyces rouxii* in continuous culture but the intracellular and extracellular concn. of the polyols varied with the dilution rate and osmoticum used to adjust the water activity to 0.960. When the water activity was adjusted with NaCl, glycerol was the main polyol accumulated intracellularly whereas glycerol and arabitol were accumulated when polyethylene glycol (PEWG) 400 was used. The extracellular glycerol and arabitol concn. at 0.960. Water activity (NaCl or PEG 400) were similar or decreased relative to cultures at 0.998 water activity. Compared to steady-state cultivat at 0.998 water activity, the yeast retained at 0.960 water activity (NaCl or PEG 400) a greater proportion of the total glycerol intracellularly against an increased concn. ratio without significantly greater production of glycerol. Arabitol was only significant in osmoregulation glycerol concn. was insufficient to balance the water activity across the membrane, but any equilibrium could be achieved under certain conditions if arabitol was also somotically active. AS

Zymomonas mobilis

555

Tanaka (H), Ishikawa (H), Osuga (K) and Takagi (HJ). **Fermentative ability of** *Zymomonas mobilis* **under various oxygen supply conditions in batch culture.** *Journal of Fermentation Technology (Hakko Kogaku Zasshi)* 69(4): 1990: 234-239

The performance of *Zymomonas mobilis* under various oxygen supply conditions in batch culture was quantitatively investigated. Although both the cell growth rate and ethanol productivity decreased with increase in the oxygen supply, the prouduction of by-products such as acetaldehyde and acetic acid increased. The ethanol productivity was more sensitive to oxygen supply than the growth rate. Oxygen supply also affected the morphology of the cells and an increase in oxygen supply resulted in the elongation of the cells. It was also found that both metabolic activity and fermentation balance were largely affected by changes in the dissloved oxygen concn. during the steady state in oxygen concn. AS

Hygiene

556

Jackson (GJ). **Public health and research perspectives on the microbial contamination of foods.** *Journal of Animal Science* 68(3): 1990: 884-891

Scientific advances in methodology and epidemiology have resulted in a renewed awareness of foodborne disease, and increased contact among nations of the world was stimulated rapid global distribution of foods as well as foodborne pathogens. New food vehicles are being identified for old, familiar pathogens, and new pathogens are being discovered. Current research in food microbiology has spurred development of rapid and specific methods to identify these pathogens and to assess their virulence. Organisms of recent interest, such as *Bacillus*, *Yersinia*, *Campylobacter*, *Listeria*, *Sporothrix*, *Giardia*, *Cryptosporidium*, and *Anisakis*, are the foci of new investigations, as are the more familiar foodborne pathogens, *Salmonella Shigella*, *Clostridium*, *Staphylococcus*, *Entamoeba* and *Ascaris*. Some foodborne organisms, such as parasitic protozoa, serve as host for unique bacterial and viral symbionts but also might become infected with mammalian viruses. The remote possibility of the transmission of human immunodeficiency viruses in foodborne protoza is discussed. AS

Bacteria

Listeria monocytogenes

557

Yousef (AE), Gajewski (RJII) and Marth (EH). **Kinetics of growth and inhibition of *Listeria monocytogenes* in the presence of antioxidant food additives.** *Journal of Food Science* 56(1): 1991: 10-13

Listeria monocytogenes strain Scott A in Tryptose Broth was treated with 100-300 p.p.m butylated hydroxyanisole (BHA), 300-700 p.p.m butylated hydroxytoluene (BHT) and 10-30 p.p.m tertiary butylhydroquinone (TBHQ). Resulting growth curves were fitted using the logistic model, and growth parameters [lag period (LP, generation time (GT), and max. growth (MG)] were calculated. BHA and BHT inhibited *L. monocytogenes* by increasing LP and GT and decreasing MG. Extent of inhibition was concn.-dependent for cultures with BHA, but not with BHT. TBHQ at 10-30 p.p.m increased LP but did not affect other parameters. LP increased exponentially with increased BHA or TBHQ in *Listeria* culture. Concn. of additive required to increase LP by one order of magnitude were 240 p.p.m for BHA and 26 p.p.m for TBHQ. AS

BIOTECHNOLOGY

558

Wasserman (BP). **Expectations and role of biotechnology in improving fruit and vegetable quality.** *Food Technology* 44(2): 1990: 68-71

This article reviews some of the methodologies such as tool of molecular biology-cloning rectors, transformation and protoplast regeneration, tissue technology and their impact on improvement of fruit and vegetable quality. The author concludes that advancement in this area is not adequate to get desired physiological benefit, hence we still have to depend heaviely on post-harvest physiology and biochemistry. GAR

TISSUE CULTURE

559

Archambault (J), Volesky (B) and Kurz (WGW). **Development of bioreactors for the culture of surface immobilized plant cells.** *Biotechnology and Bioengineering* 35(7): 1990: 702-711

The scaleup of the technique of plant cell surface immobilization was performed successfully in specifically designed lab. size bioreactors. The immobilizing matrix was formed into a vertically wound spiral providing for a high immobilizing area-to-vol. ratio (0.8-1.2 cm^{-1}). A modified airlift and a mechanically stirred vessel delivered a best bioreactor performance characterized by low biomass frothing and highly efficient plant cell attachment and retention (greater than or equal to 96%). The growth of *Catharanthus roseus* cells investigated in these bioreactors was found not to be mass transfer limited. It required milk mixing and aeration levels (K_La 10-15 h^{-1}). The biomass formation pattern of surface immobilized plant cells generally exhibited a linear growth phase followed

by a stationary phase characterized by the presence of residual carbohydrates in the medium, contrary to suspension cultures. This behaviour was found to depend on the plant cell type and/or line cultured, as well as on the inoculum age. The space restriction and unidirectional growth of the SIPC bioflim combined with the limited availability of essential intracellular nutrients rapidly accumulated from the medium by the stationary phase inoculated plant cells all likely contributed to the culture behaviour. AS

FOOD ADDITIVES

Flavour

560

Sadler (GD) and Braddock (RJ). **Absorption of citrus flavor volatiles by low density polyethylene.** *Journal of Food Science* 56(1): 1991: 35-37, 54

The ability of low density polyethylene (LDPE) to absorb citrus flavour compounds was examined. The LDPE sample was mounted on an oxygen electrode. As volatiles were absorbed, oxygen permeation through the polymer increased. Limonene, ethyl butyrate, myrcene, and α-pinene were readily absorbed by LDPE. Octanal, citral, linalool, and α-terpineol were absorbed at much lower levels. Time-course changes in readings were used to calculate diffusion coeff. of volatiles in the polymer. Diffusion coeff. were proportional to the volatile's solubility in the polymer. AS

Sweeteners

561

Bachhawat (AK) and Raghavendra Rao (MR). **In search of sweeteners.** *Science Today* 24(4): 1990: 42-46

CEREALS

Barley

562

Simos (G) and Georgatsos (JG). **Immobilization of barley β-glucosidase on solid supports yields and properties.** *Applied Microbiology and Biotechnology* 33(1): 1990; 51-53

β-glucosidase (cellobiase) of barley meal, purified to homogeneity, was immobilized on three different solid supports: agarose, glass, and phenolic resin. In all cases immobilization resulted in small increase in K_m values and decreases in catalytic constant values In the case of the Sepharose-immobilized enzyme a significant increase in thermal stability was observed. AS

563

Henry (RJ) and Cowe (IA). **Factors influencing the hardness (milling energy) and malting quality of barley.** *Journal of the Institute of Brewing* 96(3): 1990: 135-136

Forty one Australian cvs of barley were tested for their hardness in terms of milling energy and were also evaluated for their malting qualities. The samples were also analysed for their protein, β-glucan and starch contents and the relationship between these parameters and inturn with malting qualities were determined. Malt modification was determined by calcofluor method. The hardness of the samples correlated positively (r = -0.49) with β-glucans and negatively (r = -0.50) with starch content. The cvs with low milling energy produced malts with good modifications (r = -0.56). NGM

564

Holmes (MG). **Relationship between pearling resistence of barely and the extract potential of the subsequent malts.** *Journal of the Institute of Brewing* 96(3): 1990: 123-124

Barley var. and cross breds were pearled in a modified strong Scott barley pearler and the wt. of pearls were recorded as pearling resistance (PR). The same samples were malted in a micrometer and the malts were assayed for their coarse concentrated hot water extract (HWE) relationship was sought between PR and HWE . There was correlation between the PR and HWE and the overall regression coeff. of r = -058 ^{xxx} was obtained. The samples were also analysed for their protein content and the coeff. for barley protein and barley hardness was r = -0.53 ^{xxx} n = 232 . The study indicated that the PR could be used to predict the malting potential of samples within a var. of barley but could not be applied to selection of progeny from a breeding programme. NGM

Oats

565

Harwalkar (VR), Ma (C-Y) and Boutin-Muma (B). **Changes of oat globulin during storage with sodium dodecyl sulphate.** *Canadian Institute of Food Science and Technology Journal* 22(4): 1989: 387-389

Structural changes occuring during storage of oat globulin solutions containing 0 to 27 mM sodium dodecyl sulphate (SDS) were examined by SDS

polacrylamide gel electrophoresis (PAGE). Oat globulin solutions stored with SDS (20 mM) at room temp. showed dissociation of the oat globulin subunit (mean MW 58,000) into acidic (AP) and basic (BP) polypeptides of mean MW 36,000 and 22,000 resp. This dissociation of subunits in the absence of a reducing agent (β-mercaptoethanol) was caused by a base-catalyzed sulphydryl-disulphide exchange reaction, since blocking of free sulphdryl groups by iodoacetate or N-ethylmaleimide prevented the dissociation of subunits. The changes emphasize the need to avoid extended storage before SDS-PAGE analysis of oat globulin and other proteins containing disulphide bonds and sulphydryl groups. AS

Rice

566

Haney (RL). **Insect-resistant rice could save food, cut storage costs and boost profits.** *Dairy and Food Sanitation* 10(1): 1989: 10-11

567

Cogburn (RR), Simonaitis (RA) and Webb (BD). **Fate of malathion and chlorpyrifos methyl in rough rice and milling fractions before and after parboiling and cooking.** *Journal of Economic Entomology* 83(4): 1990: 1636-1639

Long-grain rough rice treated with malathion (14 p.p.m.) or chlorpyrifos methyl (Reldan) (6 p.p.m. or 12 p.p.m.) was sampled after 1, 6 and 12 wk. Samples from each treatment were processed raw or were parboiled with fresh steeping water, once-used, and twice-used steeping water. Three replicates of rough rice and of each milling fraction were preserved, and three of milled rice were cooked. Chemical residues were measured on rough rice, hulls, brown rice bran, milled rice, and cooked rice. Parboiling reduced residues on rough rice and hulls but tended to increase residues in the other fractions. Residues of Reldan in bran were substantially increased by parboiling. Doubling the amount of Reldan applied to rough rice approx. doubled the residues found in the milling fractions. Small amounts of the protectants survived all processing including cooking. Residues of malathion in cooked rice averaged about 0.016 p.p.m. in nonparboiled and 0.013 p.p.m. in parboiled rice. Residues of Reldan in cooked rice was commensurate with the amount applied to rough rice. When nonparboiled rice and 0.065 p.p.m. in parboiled rice. When applied to rough rice at 12 p.p.m., residues in cooked rice averaged 0.053 p.p.m. in nonparboiled rice and 0.15 p.p.m. in parboiled rice. Legal tolerances were not exceeded in any milling fraction. Reuse of the steeping water had little or no effect on residues. AS

Brown rice

568

Sabularse (VC), Liuzzo (JA), Rao (RM) and Grodner (RM). **Cooking quality of brown rice as influenced by gamma-irradiation, variety and storage.** *Journal of Food Science* 56(1): 1991: 96-105, 108

Two long grain and one medium grain brown rice var. were gamma-irradiated at 1.0 and 2.0 kGy to ascertain if cooking time could be decreased and to determine effects of storage on chem. and physical characteristics. A tendency toward decreased cooking time was observed as dose level increased. Cooking time was not significantly (P greater than or equal to 0.05) affected the storage. A trend was noted in water uptake ratios, soluble starch of residual cooking water and volume expansion due to irradiation. Storage of irradiated rice produced similar changes to those nonirradiated rice. Var. also contributed to differences in irradiated samples, such as cooking times, water uptake, starch retention and grain vol. expansion. AS

Wheat

569

Dexter (RH), Kilborn (RH) and Preston (KR). **The baking performance of Canadian bread wheat classes using a Colombian high-fat high-sugar short process.** *Canadian Institute of Food Science and Technology Journal* 22(4): 1989: 364-371

570

Khoshab (A). **The determination of captafol in wheat using a multi-residue method in conjuction with gel permeation chromatography clean-up.** *Flour Milling and Baking Research Association Bulletin* No.1: 1990: 22-26

The results in this study shows that the 5% SP-2401 on 100-120 mesh supelcoport column operated at an oven temp. of 220 C and detection temp. of 250 C provided the best GC conditions for quantification of captafol. Complete purification of the extract was achieved with gel permeation chromatography (GPC) and no substances were found to interfere with GC analysis of captafol. The mean recoveries of captafol through the GPC and from fortified wheat at the level of 0.2 mg/kg were 99.5% and 92%,resp. The method was sensitive down to 0.02 mg/kg. It is concluded that the Bottomley and Baker method in conjuction with GPC may be used for the detn. of captafol in wheat. SRA

571

Izydorczyk (MS), Biliaderis (CG) and Bushuk (W).

Oxidative gelation studies of water-soluble pentosans from wheat. *Journal of Cereal Science* 11(2): 1990:, 153-169

The gel formation potential of purified wheat water-soluble pentosans and their fractions, arabinoxylan and arabinogalactan, in the presence of hydrogen peroxide/peroxidase was investigated by small amplitude oscillatory rheological measurements. Gelation proceeded in two stages; a rapid increase in gel rigidity (G) during the first hour, followed by a much lower rate of gel development thereafter. Disappearance of feruloyl groups coincided with the first stage of the gelation process. Gel permeation chromatography on Sepharose CL-4B and Sephacryl S-300 revealed that only arabinoxylan actively participated in the network. The rate and extent of gel rigidity development was dependent on polymer and oxidant concn. Temp. had a negative effect on the gelation process. Gel network development with ferric chloride was similar to that with hydrogen peroxide/peroxidase, while (ammonium persulphate) induced gelation at a much lower rate. The cross-linked pentosans and arabinoxylan held up to 100 g of water per g of polymer. AS

572

Murray (LF) and Moss (R). **Estimation of fat acidity in milled wheat products. Colorimetric determination.** *Journal of Cereal Science* 11(2): 1990: 171-177

Fat acidity of milled wheat products was determined by copper soap colorimetry. The procedure involved dissolving chloroform-extracted oil in iso-octane (2,2,4-trimethyl-pentane) and measuring the colour developed by the interaction of fatty acids with a cupric acetate-pyridine reagent. The method was accurate and reproducible. Equivalent results were obtained with oleic, linoleic and plamitic acids, the three major component fatty acids of wheat oil. Results were compared with the American Association of Cereal Chemists (AACC) official titration method. The colorimetric procedure provides decided advantages over the AACC method; these include objectively of measurement, more rapid analysis, ease of assay at high levels of fatty acids and a more accurate detn. of acidity due to fatty acids. Results were also not affected by emulsion-forming polar lipids, which can occur when using the AACC titration method. AS

573

Kieffer (R), Kim (JHJ), Walter (C), Laskawy (G) and Grosch (W). **Influence of glutathione and cysteine on the improver effect of ascorbic acid sterioisomers.** *Journal of Cereal Science* 11(2): 1990: 143-152

The effects of the 4 ascorbic acid (AA) sterioisomers on the rheology of flour-water doughs were determined using a microscale extension test 1. Three-AA had the greatest dough strengthening effect. Both D- and L-erythro AA were less active, and D-threo-AA was inactive. This ranking was not changed by addition of reduced glutathione (GSH) or cysteine (Cys), and it corresponds to the substrate specificity of the glutathione dehydrogenase (GSH-DH) enzyme occuring in wheat. Variation in the concn. of the thiols revealed that Cys lowered the improver effect of L-threo-AA more than GSH . Gluten was isolated in the presence of air and without AL-threo-AA . The improver effect was more apparent for gluten-nitrogen than for gluten-air. The results support the hypothesis that the improving effect of L-threo-AA is due, at least in part, to the function of L-threo-AA-DHAA in the oxidation of GSH catalysed by GSH-DH. AS

574

Mossor (G) and Skupin (J). **Isolation and identification of trypsin inhibitors from wheat grain, beta variety.** *Die Nahrung* 34(2): 1990: 115-123

575

Nadeau (DB) and Clydesdale (FM). **Effect of Zn concentration, Ca source, percent milkfat and homogenization on Ca, Fe and Zn solubility in wheat cereal systems under simulated gastrointestinal pH.** *Journal of Food Science* 56(1): 1991: 146-150

An *in vitro* sequential pH treatment, simulating the gastrointestinal tract, was used to evaluate effects of Zn fortification, source of Ca and milk type (skim, 1 and 2% fat, homogenized and unhomogenized whole) on Ca, Fe and Zn solubility in moderately (MF) and highly fortified (HF) whole wheat cereals. In both cereals, soluble Zn significantly increased in response to fortification level. While calcium carbonate supplemented skim milk promoted mineral solubility in all MF systems, whole milk was most effective in the HF systems. This effect was apparently related to % milkfat and the homogenization process. AS

Wheat flour

576

Nagano (H), Omori (M) and Shoji (Z). **Characteristics of wheat-flour dough using *Enterobacter cloacae* GAO with and without yeast.** *Journal of Food Science* 56(1): 1991: 106-108

The leavening bacterium *Enterobacter cloacae* GAO

made dough rise, without shrinkage or flattening due to refrigeration. The GAO plus yeast mixture was allowed to ferment from 20 to 25% of the time for the GAO alone. The ratio of 0.5% yeast vol. to wheat flour was acceptable. The yeast was used in the dough to make *mantou* (a type of bun). Both *mantou* vol. and pH declined after 3 days refrigeration. The GAO and yeast mixture could withstand 5-7 days refrigeration before falling. AS

MILLETS

Corn

577

Giga (DP) and Zvoutete (P). **The evaluation of different insecticides for the protection of maize against some stored product pests.** *International Pest Control* 32(1): 1990: 10-13

The efficacy of malathion with other insecticides (alphamethrin, methacripos, and pirimiphos) as grain protectants in controlling *Sitophilus zeamais* and *Tribolium castaneum*. The persistency of insecticides tested, and the ability of selected insecticides in protecting maize under high infestation pressure are compared in this investigation. The adult insects were exposed to treated maize for 1, 7 and 14 days over a storage period of 120 days. Pirimiphos-methyl, chlorpyriphos methyl, fenitrothion and bendiocarb were found to be most effective against sp. tested, being persistent and insecticidally active for duration of the trial (120 days). Malathion, alphamethrin and deltamethrin were effective for 90 days but lost their efficiencies rapidly there after. SRA

578

Beaver (RW), Wilson (DM) and Trucksess (MW). **Comparison of postcolumn derivatization liquid chromatography with thin-layer chromatography for determination of aflatoxins in naturally contaminated corn.** *Journal of the Association of Official Analytical Chemists* 73(4): 1990: 579-581

579

Likimani (TA), Sofos (JN), Maga (JA) and Harper (JM). **Extrusion cooking of corn/soybean mix in presence of thermostable** α-amylase. *Journal of Food Science* 56(1): 1991: 99-105, 108

A fractional factorial exp. of a 3^4 second order orthogonal design was used to study properties of extrusion processed corn/soybean (70/30%, w/w) mixtures in presence of thermostable α-amylase. The viscosity of gruels made from extrudates of corn/soybean mixtures with no added α-amylase was more than 1000-fold higher than that of products extruded with added enzyme. Changes in viscosity and water solubility and adsorption indices of slurries from extrudates made under different conditions, indicated enzymatic starch hydrolysis was increased in the extruder when α-amylase was included. The results should be useful in selecting extrusion conditions to yield low viscosity-high nutrient density gruels from extruded products. AS

Corn meal

580

Chen (J), Serafin (FL), Pandya (RN) and Daun (H). **Effects of extrusion conditions on sensory properties of corn meal extrudates.** *Journal of Food Science* 56(1): 1991: 84-89

Yellow corn meal was extruded in a ZSK-30 Werner and Pfleiderer twin screw extruder. Exp. used a surface response method which included variations in screw speed (100-300 rpm), heating temp. (100-200 C) and moisture (20-30%) in the feed. Descriptive sensory analysis characterized appearance, aroma, flavour and texture of extrudates. Temp. was the most significant factor affecting Munsell value, airiness, toasted corn aroma, and flavour, denseness, crispiness, chewiness and hardness of extrudates. Temp. and feed moisture had significant effects on Munsell value, surface texture, raw flour aroma, toasted corn aroma and flavour, chewiness and hardness. Interaction between temp. and screw speed had significant effects on airiness and denseness of extrudates. AS

PULSES

Cowpeas

581

Ogunsanwo (BM), Faboya (OO), Idowu (OR) and Ikolun (T). **Reduction of aflatoxin content of infected cowpea seeds during processing into food.** *Die Nahrung* 33(6): 1989: 595-597

Dry beans

582

Drumm (TD), Ian Gray (J) and Hosfield (GL). **Variability in the major lipid components of four market classes of dry edible beans.** *Journal of the Science of Food and Agriculture* 50(4): 1990: 485-497

The lipid comp. of dry edible beans (*Phaseolus vulgaris* L) was characterised and the variability between 4 US market classes (navy, dark red kidney,

pinto and Black Trutle Soup) was determined. The total lipid content of the beans ranged from 1.8 to 2.6 ng per 10-0 g dry wt. Triacylglycerol, esterified steryl glucoside and phosphatidylcholine were identified as the major lipid class components of the netural lipid, glycolipid and phospholipid fractions, resp. The fatty acids were highly unsaturated; linolenic acid was the major fatty acid. Three sterols, campesterol, stigmasterol and β-sitosterol, were identified. The lipid and fatty acid contents of the bean classes were significantly (P 0.05) different. Principal component analysis of the total lipid components resulted in the extraction of 4 factors, which accounted for 93.3% of the variability of the data set. These factors were characterised as the (I) fatty acid, (II) sterol, (III) lipid class, and (IV) oleic acid factors. AS

Kidney beans

583

Rozo (C), Bourne (MC), Hood (LF) and Van Soest (PJ). **Effect of storage time, relative humidity and temperature on the cookability of whole red kidney beans and on the cell wall components of the cotyledons.** *Canadian Institute of Food Science and Technology Journal* 23(1): 1990: 72-75

Red kidney beans were stored for 8 months under three storage conditions 1) 0 C, 2) 30 C -80% RH; 3) 40 C - 80% RH. Hardness of cooked whole beans from treatments 2 and 3 increased during storage. Application of the detergent system for analysis of cell wall components to whole ground cotyledons showed significant increase in cell wall content, cell wall nitrogen and hemicellulose for cotyledons of treatment 3. These increases were highly correlated with hardness of cooked beans. Acid detergent residue, lignin and cellulose contents of cotyledons did not change in any of the treatments. The synthesis of N containing compounds in cells walls during adverse storage may be a contributing factor in the development of hardness by hindering dissolution of the middle lamella during cooking. AS

Lima beans

584

Musakhanian (J) and Alli (I). **Crystalline nature of acid extracted proteins from** *Phaseolus* **beans.** *Canadian Institute of Food Science and Technology Journal* 23(1): 1990: 47-52

The microscopic structures of proteins, extracted at room temp. from *Phaseolus* beans with eighteen organic acid solutions and precipitated by refrigeration at 5 C for 108 h, were investigated. Bipyramidal crystals were obtained with each of seventeen organic solutions used to extract large lima beans and baby lima beans (*P. lunatus*) At least five sizes of bipyramidal crystals acid groups, number of hydroxy groups and the presence or absence of carbon-carbon double bonds in the organic acids had little effect on the formation of bipyramidal crystals or the size of the bipyramidal crystals obtained. White kidney beans (*P. vulgaris*) extracted with citric acid solutions resulted in the formation of bipyramidal crystals depending on the protein concn. of the extracts. The crystalline isolates were glycoproteins with mannose as the principal sugar. The mannose contents of the crystalline isolates were considerabley greater than the mannose contents of amorphous isolates. AS

OILSEEDS AND NUTS

Groundnuts

585

Young (CT) and Schadel (WE). **Microstructure of peanut (*Arachis hypogaea* L. cv. Florigiant) cotyledons after oil cooking.** *Journal of Food Science* 56(1): 1991: 76-79

The microstructure of peanut (*Arachis hypogaea* L. cv. Florigiant) cotyledon before and after oil cooking at 160 C (10 min) was investigated with light microscopy (LM), scanning electron microscopy (SEM), and transmission electron microscopy (TEM). Principal observations included thermal modification of the cytoplasmic network, lipid bodies, protein bodies, starch, and cell-to-cell junctions during oil cooking. AS

Rapeseeds

586

Gattinger (LD), Duvnjak (Z) and Khan (AW). **The use of canola meal as a substrate for xylanase production by** *Trichoderma reesei*. *Applied Microbiology and Biotechnology* 33(1): 1990: 21-25

Tests made utilizing canola meal as a substrate for the production of xylanase indicate that *Trichoderma reesei* produced this enzyme in similar or better yields from canola meal than from Solka-floc, xylan or glucose. The max. xylanase activity obtained from canola meal was 210 IU/ml in 9-12 days. The enzyme system produced using canola meal also contained a higher proportion of acetyl-xylan esterase, cellulase, and xylosidase activities. This system was more than or equally efficient as that produced using Solka-floc in hydrolysing canola meal, corn cobs, corn and wheat brans, straw, and larchwood xylan to fermentable sugars. AS

587

Cenkowski (S), Sokhansanj (S) and Sosulski (FW). **The effect of drying temperature on green colour and chlorophyll content of canola seed.** *Canadian Institute of Food Science and Technology Journal* 22(4): 1989: 383-386

When *Brassica campestris* L. cv. Tobin was harvested at stages from 52.0% to 16.0% seed moisture, the percentage of distinctly green seed decreased from 64.0% to 2.0%. Leaving the same plants in swaths for 4 days reduced the moisture content and green seed count substantially at each stage. Drying the high moisture samples (30%) at 80 C was also effective in reducing the proportions of distinctly green seeds to 3.0% but 20, -40 C were the best drying temp. for samples containing less moisture. Based on the standard of 24 p.p.m. chlorophyll max. in the top canola grade, it was apparent that artificial drying of freshly-harvested seed was only partly successful in improving canola grades. However, swathing seed at 37.1% moisture and then drying the swathed seed at 40 C reduced chlorophyll content from 144 to 23 p.p.m. AS

588

Lange (R) and Linow (F). **About the analysis of the glucosinolates in rapeseeds and extraction flakes.** *Lebensmittelindustrie* 36(3): 1989: 135-138

In connection with the introduction of the glucosinolate content as quality index of rapeseed in trade and processing enterprises, the aptitude of methods of analysis of glucosinolates in rapeseeds and extraction flakes is studied. The range of application, the workability and necessary applications, is highlighted. The choice of methods is discussed in dependence on the purchase, sale and processing of rapeseed and on the sale of the extraction flakes. AS

Soybeans

589

Taira (H), Tanaka (H), Saito (M) and Saito (M). **Effect of cultivar, seed size, and crop year on total and free sugar contents of domestic soybeans.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 37(3): 1990: 203-213 (De)

Investigations have been carried out to determine the effect of cvs, seed size, and crop year on the total and free sugar contents of soybeans of 13 cvs grown at the same location in the normal and unseasonable of two crop yrs. When the seed size decreased, total sugar, free types of total sugar, raffinose, and stachyose contents increased (102-116%), and the increased ratios of raffinose and stachyose were higher than those of other sugars. On the other hand, only sucrose content slightly decreased (93-99%). The cvs, as compared with the seed size, was more influential on the all sugars, and higher contribution ratios were observed in cvs. The unseasonable yr showed high in all sugar contents (103 0-122%), and the highest difference between the two crop yrs was observed in the sucrose content. Significant differences were observed in total sugar, free type of total sugar, sucrose, raffinose, and stachyose among the cvs, and in total sugar, free type of total sugar, and sucrose between the crop yrs. From the contribution ratio, crop yr was higher than cvs in all sugars except raffinose and stachyose. AS

590

Moharram (YG), Youssef (AMM) and El-Sahn (MA). **Bread like products from soybean-rice flour.** *Die Nahrung* 34(2): 1990: 135-140

This paper investigates the use of the natural fermentation in preparing leavened products using soybean and rice flours, and conditions required to make these products and the changes occurring during their preparation The effect of soybean soaking time, soybean-rice flour proportion and fermentation time on the total solids, total soluble solids, pH, acidity, leavening, viscosity and microbial count of the batter and on the sensory properties of the end cooked products were studied. Generally the panelists preferred the fried and prefried products made from 16 h fermented 1:1 or 1:2 18 h soaked soybean:rice flour batter. BV

Soy products

591

Shen (CF), De Man (L), Buzzell (RI) and De Man (JM). **Yield and quality of *tofu* as affected by soybean and soy milk characteristics. Glucono-delta-lactone coagulant.** *Journal of Food Science* 56(1): 1991: 109-112

Nine light hilium soybean [*Glycine max* (L.) Merr] cvs were used to study characteristics that affect yield and quality of *tofu* (soybean curd) coagulated with glucono-delta-lactone (GDL). Pressed and packed (nonpressed) curds were examined. Yield of *tofu* was not affected by size of beans. Protein and total solids in soy milk increased when protein and moisture increased in soybeans. Yield of pressed GDL *tofu* increased with protein content of soybeans (or soy milk) plus decreased Ca content. Fracturability of pressed GDL tofu incresed with levels of P. Hardness of packed *tofu* increased with protein content in soy milk. Yield of pressed GDL *tofu* was 20% higher than calcium sulphate *tofu*. AS

Soy proteins

592

Kamata (Y), Umeya (J-I), Kimura (M), Tanii (S) and Yamauchi (F). **Effect of heating rate and high-temperature holding on soy protein gel viscosity.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 37(3): 1990: 184-190 (Ja)

Effect of heat treatment methods on soybean globulin gel viscosity were studied. Changes in viscosity during the heat treatment and thixotropic behaviour of the samples before and after the heat treatment were studied. β-Conglycinin became more viscous when a rising rate in temp. was small. On the other hand, the viscosities of glycinin gel did not increase at all at any heating rate, except a case at 35 C/h. When the β-conglycinin solutions were stood at 90 C for 20 min during the heating process, their viscosities increased by this treatment and the final viscosities were also higher than those of the samples treated by the standard method. In the case of glycinin, however, the response was more complex. The viscosities increased at low protein concn., whereas they sharply dropped after initial small increase in the cooling process at high protein concn. These results suggest that the formed gels were destoryed by shear in the viscosity measurements and the destoryed structures were not reformed in the case of glycinin. It can therefore be presumed that β-conglycinin gels were formed with non-covalent bonds which is easily restored by standing. AS

593

Arce (CB), Pilosof (AMR) and Bartholomai (GB). **Sodium dodecyl sulphate and sulphite improve some functional properties of soy protein concentrates.** *Journal of Food Science* 56(1): 1991: 113-115

The effects of sodium dodecyl sulphate (SDS) and sodium sulphite were studied on dispersibility, water and oil absorption of soy protein conc. from toasted soy flours. Dispersibility was improved from 6.2% to 65% by 0.5% SDS, 0.25% sodium sulphite at pH 6, and 60 C. Water absorption was improved from 5.5 to 7 mL water/g conc. by 0.5% SDS at pH 6 at 20 C. Oil absorption was improved from 4.1 to 5.9 mL oil/g conc., by 0.5% SDS, 0.25% sodium sulphite at pH 6 and 20 C. AS

TUBERS AND VEGETABLES

594

Morris (JR). **Fruits and vegetables harvest mechanisation.** *Food Technology* 44(2): 1990: 97-101

Aspects covered include: cane and vine fruits (grape, raisin grapes, and strawberries) tree fruits (apples, apricots, cherries, and peaches), vegetables (corn, cucumbers, tomatoes, and pod vegetables). SRA

Bulb vegetables

Garlic

595

Ceci (LN), Curzio (OA) and Pomilio (AB). **Effects of irradiation and storage on the flavour of garlic bulbs cv "Red".** *Journal of Food Science* 56(1): 1991: 44-46

The effects of 50 Gy gamma-irradiation 30 days after harvest on the flavour of garlic bulbs cv "Red" during storage at room temp. for 300 days were evaluated. The contents of sulphur compounds and enzymatic pyruvate (EP) were determined by GLC and spectrophotometry as a measure of flavour intensity. Upon comparison of irradiated and nonirradiated bulbs no differences were observed in the contents of EP, cyclic disulphide compounds 144-I + 144-II (GLC-induced rearrangement products of allicin, the chief flavour components), and diallyl disulphide (DADS). At the end of the storage both samples showed a significant reduction in 144-I + 144-II and EP. On the contrary, DADS underwent an increase in both treatments. AS

Root vegetables

Parsnip

596

Shattuck (VI), Kakuda (Y) and Yada (R). **Sweetening of parsnip roots during short-term cold storage.** *Canadian Institute of Food Science and Technology Journal* 22(4): 1989: 378-382

Parsnip (*Pastinaca sativa* cv. All-American) were assessed for free sugars at harvest and after storage for 3, 7 and 14 days at 0 and 10 c. Sugar accumulation was more rapid in roots stored at 0 than 10 C and in the core than in the cortex. Roots stored for 7 days at 0 C were perceived to be sweeter than roots stored for the same period at 10 C for freshly-harvested roots, suggesting that an improvement in the eating quality of roots during short-term cold storage is possible, but temp. dependent. The four principal sugars in roots after 2 wks of storage at 0 C included sucrose, fructose, glucose and an unidentified trisaccharide. AS

Tubers

Potatoes

597
Singh (RG) and Nirankar Nath. **Development of potato based protein-rich food supplements.** *Die Nahrung* 34(2): 1990: 153-157

Potato-based low cost protein rich (15.7% protein) food can be prepared from soy flour-soy slurry-potato paste blended in the proportion of 17:33:50. Full fat flour was prepared from soy cotyledons blanched in boiling water for 1.5 min., dried and milled. For soy slurry cotyledons were soaked 4 h in water and blanched in boiling water for 10 min. Potatoes were boiled, peeled and mashed. Drying the product to about 8% moisture took approx. 7 h at 80 plus or minus 1 C in a tray drier. The product was very well accepted as deep fat fried snack. It could be used in the form of sweetened gruel also. AS

Vegetables

598
Berrang (ME), Brackett (RE) and Beuchat (LR). **Growth of *Aeromonas hydrophila* on fresh vegetables stored under a controlled atmosphere.** *Applied and Environmental Microbiology* 55(9): 1989: 2167-2171

The effects of controlled-atm. storage (CAS) on the survival and growth of *Aeromonas hydrophila* on fresh asparagus, broccoli, and cauliflower were examined. Two lots of each vegetable were inoculated with *A. hydrophila* 1653 or K144. A third lot served as an uninoculated control. Following inoculation, vegetables were stored at 4 or 15 C under a CAS system previously shown to extend the shelf-life of each commodity or under ambient air. Populations of *A. hydrophila* were enumerated on the initial day of inoculation and at various intervals for 10 days (15 C) or 21 days (4 C) of storage. Direct plating of samples with selective media was used to enumerate *A. hydrophila*. The organism was detected on most lots of vegetables as they were received from a commercial produce supplier. Without exception, the CAS system lengthened the time vegetables were subjectively considered acceptable for consumption. However, CAS did not significantly affect populations of *A. hydrophila* which survived or grew on inoculated vegetables. AS

599
Leser (ME), Luisi (PL) and Palmieri (S). **The use of reverse micelles for the simultaneous extraction of oil and proteins from vegetable meal.** *Biotechnology and Bioengineering* 34(9): 1989: 1140-1146

600
Hemeda (HM) and Klein (BP). **Inactivation and regeneration of peroxidase activity in vegetable extracts treated with antioxidants.** *Journal of Food Science* 56(1): 1991: 68-71

Reduction of peroxidase activity was determined in tomato, carrot or eggplant extracts using antioxidants (quercetin, rutinic acid, chlorogenic acid, and α-tocopherol) alone or with heat treatment. Regeneration of peroxidase at room temp. and after frozen storage (-18 C for 4 wk) was measured. Combining antioxidant (125 mg%, w/v) and heat (2 min at 75 C) resulted in almost complete inhibition of vegetable peroxidases. Regeneration of peroxidase in extracts both heated and treated with antioxidants was less than in those only heated or antioxidant-treated. After frozen storage, peroxidase regeneration was reduced to zero in heated + antioxidant treated extracts. AS

Leafy vegetables

Asparagus

601
Ganthavorn (C), Nagel (CW) and Powers (JR). **Thermal inactivation of asparagus lipoxygenase and peroxidase.** *Journal of Food Science* 56(1): 1991: 47-49, 79

Thermal stability of lipoxygenase (LOX) and peroxidase (POD) in fresh asparagus tips and partially purified asparagus LOX and POD were compared. In all cases, heating at 50, 60 and 70 C resulted in higher percentages of residual LOX activity than POD activity. Inactivation of LOX followed first order kinetics while inactivation of POD followed a biphasic curve. Activation energies for thermal denaturation of the partially purified enzymes were 47.5 kcl/mol for LOX and 41.9 kcal/mol for POD. AS

Lettuces

602
Bolin (HR) and Huxsoll (CC). **Effect of preparation procedures and storage parameters on quality retention of salad-cut lettuce.** *Journal of Food Science* 56(1): 1991: 60-62, 67

Piece-size reduction, which is required in preparing lettuce for salads, shortens storage life of cut lettuce as compared to uncut head lettuce. Cellular fluids, released during cutting, are removed by rinsing with

water, followed by centrifugation to remove added surface moisture. Extended centrifugation can cause desiccation of product, which may be beneficial under certain conditions. Other methods of water removal, such as blotting or forced air did not seem practical. During storage green pigmentation decreased in salad-cut lettuce. Optimum cold storage was obtained by packaging the cut-lettuce in pouches that had been slightly evacuated and contained a small amount of carbon monoxide. AS

Tomatoes

603

Brown (ED), Yada (RY) and Stanley (DW). **Chilling injury and modified atmosphere storage of mature green tomatoes.** *Canadian Institute of Food Science and Technology Journal* 22(4): 1989: 339-344

The effect of various atm. treatments on chilling injury (CI) in mature green tomatoes was investigated. Fruits were stored under air atm., modified atm. (MA) (2% carbon, 3% oxygen) and MA with an ethylene pretreatment at both chilling (5 C) and nonchilling (12.5 C) temp. Tomatoes were sampled at 11, 22, 33, and 44 days and measurements of rot, puncture force, colour, carbon dioxide and ethylene were taken during 14 day ripening period at ambient conditions. The results indicate that an ethylene pretreatment in conjunction with MA had some effect in delaying CI in mature green tomatoes stored at 5 C. It, however, was not more useful than MA alone with fruit stored at 12.5 C, possibly due to increased ethylene independent respiration at this temp. AS

604

Nakhasi (S), Schlimme (D) and Solomos (T). **Storage potential of tomatoes harvested at the breaker stage using modified atmosphere packaging.** *Journal of Food Science* 56(1): 1991: 55-59

Breaker tomatoes sealed in polymeric film (MAP) were stored at 15 C for 23 days. A steady state of about 3.5-4.0% oxygen and carbon dioxide was established. Mean concn. of gases within 24 h of packaging were min 2.5% oxygen and max 8.0% carbon dioxide. Thereafter gas concn. moved gradually to a steady state; no evidence of anoxic conditions occurred. After 23 days of MAP storage fruit ripened normally under ambient conditions. Quality evaluations demonstrated that 15 C MAP storage permitted harvesting of breaker stage of ripeness tomatoes without reducing storage life to an unacceptable duration. MAP delayed changes in acidity, soluble solids, texture, colour and polygalacturonase activity and resulted in substantial reduction in fruit wt. loss and spoilage as compared to breaker fruit without film packaging. AS

FRUITS

605

Toledo (RT) and Chang (S-Y). **Advantages of aseptic processing of fruits and vegetables.** *Food Technology* 44(2): 1990: 72-79

Aseptic processing of fruits and vegetables will invite more serious considerations from processes of a quality advantage. The quality advantage appears to exhibit for low acid products but has not been demonstrated in high acid products. The economic advantage of bag-in-box technology for products intended for institutional use may drive emphasis in aseptic technology towards that application in the near future. GAR

606

Woodroof (JG). **50 years of fruit and vegetable processing.** *Food Technology* 44(2): 1990: 92-95, 101

This article covers changes in Academia and industry, major processing techniques, canning of fruits and vegetables (continuous agitating cookers aseptic packaging, aseptic drum processing, hydrostatic cookers), freezing, drying, pickling (brining) other technological (use of sweeteners, packaging and irradiation) and new product development. BV

Apples

607

Haag (S). **Rational peeling process for apples.** *Lebensmittelindustrie* 36(3): 1989: 132-134, 135 (De)

A rational peeling method with a yield of more than 60% based on the chem. and thermal treatment of apples is described. The process parameters of the chemical and thermal treatment and the treatment solution is discussed. BV

Bananas

608

Agravate (JU), Mastui (T) and Kitagawa (H). **Effect of ethanol on ripening and amylase activity of banana.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 37(3): 1990: 235-238 (Ja)

Spraying with 5 ml of 40% or 60% ethanol per 6l container advanced the ripening of Cavendish bananas stored at 20 C by 1-3 days. The more rapid rate of ripening in the treated fruits resulted in lower starch content and higher contents in total sugar, sucrose and reducing sugar compared with the control. α-amylase activity was generally higher in fruits treated with 40% or 60% ethanol. The increase in the activity of the enzymes occurred much later than the commencement of starch hydrolysis. AS

Blueberries

609

Day (NB), Skura (BJ) and Powrie (WD). **Modified atmosphere packaging of blueberries. Microbiological changes.** *Canadian Institute of Food Science and Technology Journal* 23(1): 1990: 59-65

Blueberries were stored at 4 C in sealed pouches consisting of plastic films of intermediate barrier (IB) and high barrier (HB) properties. Microbial counts, headspace comp., fruit pH and soluble solids were followed with storage time. The atm. within the fruit packages constructed from IB film remained aerobic (6% oxygen) with a relatively low carbon dioxide level (4% carbon dioxide). Microbial growth was affected by the oxygen limitation after six wks storage, but this storage condition could not suppress mould spoilage of the berries. In the packages constructed from the HB film, an anaerobic atm. developed within two wks, and anaerobic respiration raised the carbon dioxide level to 70%. No microbial spoilage was observed in blueberries packed in HB film, even after 12 wks storage. AS

Cherries

610

Schwab (W) and Schreier (P). **Studies on bound aroma compounds of sour cherry fruit** (*Prunus cerasus* **L.**). *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 190(3): 1990: 228-231 (De)

Acid-catalyzed (pH 1) and enzymic (emulsin) hydrolyses of compounds isolated by ethyl acetate elution of a sour cherry fruit (*Prunus cerasus* L. cv. Schattenmorelle) extract, obtained by Amberlite (XAD-2 adsorption, indicated the presence of, among others, aromatic aroma compounds such as benzaldehyde, benzylalcohol, benzoic acid and eugenol, as well as monoterpenes such as 2,6-dimethyl-octa-2(E),7-diene-1,6-diol. This monoterpene diol was identified as the precursor of terpenes of the dehydrolinalool oxidation state formed by acid treatment. However, the precursor of monoterpenes of the linalool oxidation state, also liberated during acid hydrolysis of sour cherry fruit extract were not identified. Identifications of volatile compounds formed were performed by capillary gas chromatography and combined capillary gas chromatography mass spectrometry. AS

Kiwifruits

611

MacRae (EA), Stec (MGH) and Triggs (CM). **Effects of postharvest treatment on the sensory qualities of kiwifruit harvested at different maturities.** *Journal of the Science of Food and Agriculture* 50(4): 1990: 533-546

The effects of various postharvest treatments on the sensory qualities of eating-ripe kiwifruit (*Actinidia deliciosa* var deliciosa (A Chev) Liang et Ferguson cv Hayward) were compared. When fruit from early harvests (5.3, 6.4% w/v soluble solids (SS at harvest) were treated with ethylene immediately after harvest, eating-ripe fruit were more juicy and generally had fewer off-odours than fruit not ripened by ethylene. A short period (4-6 wks) of storage at 0 C was beneficial to fruit quality, particularly when applied to fruit from early harvests. Flavour intensity was enhanced, and off-flavours, greenness and acidity were decreased. There was variation in fruit quality between orchards. The poorest quality fruit were those from one orchard after storage at 4 C for 4 wks or at 0 C for 12 wks prior to ripening. The fruit stored at 4 C was notable for its lack of sweetness and high incidence of earthy off-flavour. Fruit from both these treatments also has a higher incidence of caramel/burnt sugar flavours than fruit from other treatments. There was no relationship between perceived sweetness and fruit sugar content, SS or sugar/acid ratios, and only a minimal relationship between perceived acidity/tang/sourness and concn. of each acid. Some suggestions are offered to explain these findings. AS

612

Matsui (T) and Kitagawa (H). **Maturity evaluation of kiwifruit determined on the basis of starch and pectin contents and related enzyme activities.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 37(3): 1990: 224-229 (Ja)

Since it is difficult to judge maturity of kiwifruit by appearance, growers measure the soluble solids (SS) content using a refractometer. In order to find a suitable harvest index other than SS and firmness, starch content, total pectin (TP) and water soluble pectin (WSP) contents, β-amylase and polygalacturonase (PG) activities of kiwifruit were investigated. The SS content, measured with a

refractometer, and firmness of kiwifruit stored at room temp. (20 C), with or without ethylene treatment were compared. Kiwifruit treated with ethylene after harvest showed more uniform firmness and SS content than those without ethylene treatment. β-Amylase and PG activities, TP and WSP contents could not be used as alternatives harvest and shipment indices for kiwifruit owing to fluctation in their values. The use of SS content as a maturity index appeared to be applicable in 'Hayward' but not in the early-ripening cv. Koryoku. If 'Koryoku' were to be harvested based on the optimum SS content, the fruit would have to be shipped within 2 days after ethylene treatment to maintain suitable firmness. In 'Koryoku', the period of highest starch content is a better maturity index than SS content. Harvesting at the suitable period would ensure longer storage and maintenance of firmness and sweetness. AS

Persimmon fruits

613

Itamura (H), Taira (S), Kitamura (T) and Fukushima (T). **An improved pre-treatment method of the assay for 1-aminocyclopropane-1-carboxylic acid in Japanese persimmon fruits.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 37(3): 1990: 239-242 (Ja)

Strawberries

614

Doullard (C) and Guichard (E). **The aroma of strawberry** (*Fragaria ananassa*). **Characterisation of some cultivars and influence of freezing.** *Journal of the Science of Food and Agriculture* 50(4): 1990: 517 531

The volatiles of 6 strawberry (*Fragaria ananassa* Duch) cvs both fresh and deep-frozen, were isolated by direct dichloromethane extraction. 60 compounds were identified and quantified by GC-MS. Characterisation of cvs was achieved by applying principal component analysis to the chromatographic data. Great differences were observed. Maxim and Directur Paul Wallbaum are rather low in volatiles while Gariguette and Tioga are rich in mesifurance (2.5-dimethyl-4-methoxy-2,3-dihydrofuran-3-one), furaneol (2.5-dimethyl-4-hydroxy-2.3-dihydro-furan-3-one) and nerolidol. Esters are the major compounds in Senga Sengana and Vicometesse Hericart de Thury. This last cvs is also characterised by high concn. of γ-decalactone. Trans-hex-2-enal and hexanal are found mainly in fresh fruits. Detn. of volatiles in stored frozen fruits have shown only slight influence on mesifurance and furaneol while the concn. of merolidol increases and that of esters decreases. AS

615

Ke (D), Goldstein (L), O'Mahony (M) and Kader (AA). **Effects of short-term exposure to low oxygen and high carbon dioxide atmospheres on quality attributes of strawberries.** *Journal of Food Science* 56(1): 1991: 50-54

Strawberries (*Fragaria ananassa* Duch., cv. 'Selva') were stored 10 days in 0.1%, 0.5%, or 0.25% oxygen or air + 20% carbon dioxide: or 6 days in air + 50% or 80% carbon dioxide at 0 or 5 C without deterimental effects on quality. Decay and softening were reduced by treatments. An untrained taste panel, under ordinary eating conditions, did not consistently differentiate 'Pajaro' strawberries kept in 0.25% oxygen from those stored in air. A trained taste panel, under controlled conditions, perceived slight off-flavour in 'G3' strawberries kept in 0.25% or 0% oxygen. This correlated with ethanol, ethyl acetate, and acetaldehyde in juice. The 50% or 80% carbon dioxide treatments caused injury after 8 to 10 days, while 20% carbon dioxide treatments did not. All high carbon dioxide treatments caused increase in pH of juice. AS

CONFECTIONERY, STARCH AND SUGAR

616

Rajan (KK). **The properties and appeal of lactose to the confectionery and bakery industries.** *Confectionery Production* 55(6): 1989: 417

Confectionery

617

Cocci (AA), Landine (RC), Leodolter (M) and Beutell (S). **Anaerobic/aerobic pretreatment of a confectionery waste.** *Dairy and Food Sanitation* 10(3): 1989: 146-150

The performance of the ADI-BVP digester and overall system has consistently exceeded design expectations since start-up, even though the organic loading to the system has been over twice the design value. The system has proven to be extremely simple to operate and requires very little operator intervention. One of the system's most attractive features is its ability to treat this raw waste which is quite variable in strength, has high levels of both suspended solids and FOG, and to digest these substances along with the waste aerobic sludge. This feature precluded the need for any equalization and primary treatment and sludge dewatering and handling equipment. Equally important is the fact that this type of system produces a min. quantity of sludge for ultimate disposal at a time when sludge

and solid waste disposal is becoming a very critical area of concern for the food industry and other industrial sectors in the United States. AS

Chewing gum

618
Samton (HA). **Recent development in the chewing gum industry.** *Confectionery Production* 55(6): 1989: 401

Chocolates

619
Lees (R). **Recipe compilation, ERH and microbiological implications in sweet and chocolate manufacture. Part 2.** *Confectionery Production* 55(7): 1989: 471, 473

620
Muntener (K). **The economics of chocolate conching.** *Confectionery Production* 55(7): 1989: 475-476

621
Hiedel (HR). **Modern chocolate paste kneading and mixing.** *Confectionery Production* 55(7): 1989: 494-495

622
Tscheusohner (HD). **Physical processes during solidification of chocolate liquor and factors of influence for at Planned precrystallization.** *Lebensmittelindustrie* 36(3): 1989: 126-131 (De)

The solidification of chocolate liquor after moulding of bars or in coatings is based on the partial crystallization of the fluid fats. The mol. structure of the molecules (triglycerides), which are part of the fat phase (e.g cocoa butter, milkfat, alternate fats to cocoa butter) and their portion influence the time of crystal nuclear formation, the portion of the solid fat content in the solid chocolate, the complete melting point, the hardness and other physical and textural properties. The knowledge of the most important factors of influence is an essential supposition of the proper choice of the process parameters for the precrystallization and mixability of fats. AS

Licorice

623
Anon. **Antisticking and glazing agents for licorice products.** *Confectionery Production* 55(6): 1989: 406-409

Definition and importance of antisticking and glazing agents (the glass, antisticking effect and taste, lubrication, protection against drying), regulations of antisticking agent, stability, types of antisticking agents for licorice and wine gums (parafin oil, partially hydrogenated vegetable oils, MCT oils, treatment of winegums and licorice with shellace, pectin solution, steaming and alcoholic dispersion) methods of using oily antisticking agents (coating pans, oiling drum, and application of felt rollers or brushes) and glazing coated strings of licorice are covered. BV

Starch

624
Maroulis (ZB), Drouzas (AE) and Saravacos (GD). **Modeling of thermal conductivity of granular starches.** *Journal of Food Engineering* 11(4): 1990: 255-271

Prediction of the effective thermal conductivity of granular and porous foods is essential in engineering calculations and in modeling of food processes. Structural models are more useful than empirical equations, since they are based on the physical and transport properties of the components of the food system. Six structural (geometric) models were tested, using experimental data on the effective thermal conductivity of granular starches in the ranges of bulk density 500-800 kg/m^3, moisture content 0-0.4 kg water/kg dry solids and temp. 25-70 C. The parallel model of heat conduction in the granular starch (solid/gas phases) and in the starch granules (dry starch/sorbed water phases) yielded the lowest standard deviation between the experimental and the predicted values of thermal conductivity. Combinations of the parallel and the Maxwell models yielded acceptable results. AS

625
Self (KP), Wilkins (TJ), Morley (MJ) and Bailey (C). **Rheological and heat transfer characteristics of starch-water suspensions during cooking.** *Journal of Food Engineering* 11(4): 1990: 291-316

The rheological and heat transfer characteristics of 1 to 6% starch suspensions were determined. The rheological results for gelatinised suspensions of 3-6% concn. were adequately represented by a Newtonian, power-law or Bingham plastic model. The experimental heat transfer results obtained covered all flow regimes. It was found that in laminar flow the Nusselt numbers measured were much larger than those predicted by correlations which ignore natural convection. The inclusion of a natural convection term in the correlations reduced the differences, but they were still large at lower

concn. The validity of correlations that include the product Gr Pr D/L as a correction term for natural convection in less-viscous liquids heated in horizontal tubes, where forced convection is the primary form of heat transfer, is questioned. AS

626

Boki (K), Imai () and Ohno (S). **Adsorption of methyl orange on starches.** *Journal of Food Science* 56(1); 1991; 90-92

Adsorption characteristics of methyl orange were investigated on kudzu, sweet potato, corn, rice, wheat, potato and snake gourd starches. No adsorption of methyl orange, an anionic dye, was observed on potato starch and snake gourd starch because of the presence of phosphate esters. Adsorption isotherms were found to fit both the Langmuir equation and Freundlich equation in all others. The degree of adsorption by kudzu, sweet potato, corn and wheat starches was related to the number of hydroxyl groups. It was suggested that methyl orange was confined to a monolayer on surface hydroxyl groups of the starches. AS

627

Wang (SS), Chiang (WC), Zhao (B), Zheng (XG) and Kim (IH). **Experimental analysis and computer simulation of starch-water interactions during phase transition.** *Journal of Food Science* 56(1); 1991; 121-124

The phase transition of a waxy corn starch, Amioca, with a limited amount of water available, upon heating, was investigated by using experimentation and computer simulation. A model based upon the stoichiometric ratio of water to anhydro-glucose unit was developed to simulate conversion of starch (gelatinization and/or melting) with different water contents. Simulation results showed a min ratio of 14 water molecules to one anhydrous glucose unit was required for complete gelatinization. A phase diagram based on this was constructed to relate water contents to gelatinization and melting of starch. AS

628

Boki (K) and Ohno (S). **Moisture sorption hysteresis in kudzu starch and sweet potato starch.** *Journal of Food Science* 56(1); 1991; 125-127

Moisture sorption hysteresis loops of kudzu starch and sweet potato starch were investigated to help understand the nature of the adsorption-desorption process. The second adsorption isotherms were above the first adsorption isotherms for kudzu starch and sweet potato starch preheated to 110 C. This was explained as an increase in the number of hydrophilic sites due to rupturing of hydrogen bonds. The hysteresis loop for kudzu starch was greater than that for sweet potato starch. This was interpreted as a difference in mesopore volume. AS

Sugar

629

Koren (DW) and Duvnjak (Z). **Pure fructose syrup and ethanol production from high fructose corn syrup supplemented with** *Jerusalem artichoke* **juice.** *Journal of Chemical Technology and Biotechnology* 47(2); 1990; 117-125

Saccharomyces cerevisiae ATCC 36859 preferentially consumes glucose from glucose-fructose mixtures. Synthetic media and complex media containing high fructose corn syrup supplemented with *Jerusalem artichoke* juice were used for the production of pure fructose syrup by the conversion of glucose to ethanol. Fructose was not converted in these processes. Increasing the concn. of Jerusalem artichoke juice increased the yields of ethanol and biomass and decreased the process time. A similar effect was obtained at a low juice concn. when a larger amount of biomass was used for the inoculum. The product from this process contained only fructose and ethanol. Use of food-grade materials results in a pure fructose syrup that is suitable for human consumption. AS

630

Gutteck (U). **Cleaning of sewage in sugar refineries-important contribution to environment protection.** *Lebensmittelindustrie* 36(6); 1989; 248-250 (De)

631

Danowski (J) and Soszynski (R). **Process for the purification of effluents from sugar refineries.** *Lebensmittelindustrie* 36(6); 1989; 251-252 (De)

632

Muller (G). **About the spoilage of sugars (sucrose) and the influence of moist storage conditions.** *Lebensmittelindustrie* 36(6); 1989; 253-255 (De)

633

Roos (Y) and Karel (M). **Plasticizing effect of water on thermal behavior and crystallization of amorphous food models.** *Journal of Food Science* 56(1); 1991; 38-43

Dehydrated sugar solutions were used as models of thermal behaviour of amorphous foods, and of the effect of temp., moisture content and time on physical state of such foods. The transition temp. determined were glass transition (T_g), crystallization

(T_{cr}) and melting (T_m) which all decreased with increasing moisture. T_g of a sucrose/fructose model had a slightly lower value than the empirical "sticky point", at all moisture contents studied. Crystallization of sucrose was delayed by addition of fructose or starch. Crystallization above T_g was time-dependent, and the relaxation time of this process followed the WLF equation. AS

Sugarcane

634
Doelle (MB) and Doelle (HW). **Sugarcane molasses fermentation by** *Zymomonas mobilis*. *Applied Microbiology and Biotechnology* 33(1): 1990: 31-33

Two different quality types of sugarcane molasses containing a total sugar content of 48% - 50% (w/v) and 35%-042% were investigated for *Zymomonas* bioethanol production. Molasses concn. of upto 25 0 g/l (1:3 dilution) were successfully fermented within 243 h despite a higher salt concn. in the lower grade molasses. Higher molasses concn. (300 g/l) led to fructose accumulations. The addition of sucrose to a final sugar concn. of 15% (w/v) led to 10% (v/v) ethanol with conversion efficiencies up to 96%. Sorbitol levels were negligible but increased up to tenfold upon addition of invertase. AS

BAKERY PRODUCTS

635
Bassiouny (SS), Hassanien (FR), Abd-El-Razik Ali (F) and El-Kayati (SM). **Efficiency of antioxidants from natural sources in bakery products.** *Food Chemistry* 37(3): 1990: 297-305

A soda cracker biscuit was processed using a fine powder of marjoram, spearmint, peppermint and basil, and their purified ether extracts as natural antioxidants. Addition of purified ether extract of each of the four plant materials gave an excellent antioxidant effect on the biscuit compared with the effect of BHA at concn. of 0.01, 0.02, and 0.03%. Addition of a fine powder of all plant materials at 0.5% gave an antioxidant effect on the biscuit, compared to the control sample. Addition of a 1% mixture of equal amounts of the four plant powders caused a pro-oxidant effect in the biscuit. AS

Bread

636
Voysey (PA). **Rope and the pH of commercial bread.** *Flour Milling and Baking Research Association Bulletin* NO.1: 1990: 13-20

Investigation was made to find out how much vinegar needed in bread to prevent the development of rope and survey was made with commercial bread to see whether the vinegar levels used are adequate to prevent multiplication of the rope bacteria. The results of storage test with bread containing different levels of vinegar addition and with loaves purchased from local retail outlet indicate the desirability of maintaining the crumb pH below 5.4 if rapid multiplication of *Bacillus subtilis* is to be avoided. Surveys of commercial breads suggest that a considerable proportion (over 50%) will have pH above this level. To achieve a pH of 5.4, investigation indicate that the amount of vinegar added will vary from one type of bread to another depending on the pH of the ingredients and buffering capacity of the flour. SRA

637
Kashlan (NB), Srivastava (VP), Mohanna (NA), Al-Motawa (YK) and Mameesh (MS). **The phytic acid content of wheat flour and major types of bread consumed in Kuwait.** *Food Chemistry* 37(3): 1990: 307-311

The content of phytate in wheat flour (*Triticum aestivum*) used in the preparation of Pita and other types of bread in the State of Kuwait was determined by an ion-exchange procedure. The phytate content in the wheat flour samples varied according to the extraction rates. A significant decrease of phytate content was noticed in all types of bread when compared to its corresponding wheat flour. AS

638
Antonia Martinez-Anaya (M), Jose Torner (M) and Bernedito de barber (C). **Microflora of the sour dough of wheat flour bread. XIV. Changes in volatile compounds during fermentation of doughs prepared with pure microorganisms and their mixtures.** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 190(2): 1990: 126-131

Wheat doughs elaborated with microbial mass from *Saccharomyces cerevisiae*, *Candida boidinii*, *Lactobacillus plantarum* and *Streptococcus faecium*, individually and in up to 13 combinations have been investigated for (a) changes during fementation in short chain (C^3-C_6) volatile organic acids, and (b) headspace gas comp. (alchols, esters and carbonyl compounds) of fermented doughs. Lactic acid bacteria, when used individually, did not produce (C_3-C_6 volatile organic acids, but when added to doughs with yeasts promoted and increase in propionic and isobutyric acids and a decrease in isovaleric acid concn. in relation to the amounts produced by the yeasts alone. n-Butyric and n-Valeric acids were present in very low amounts that did not change during fermentation in any of

the samples studied. The headspace gas from doughs with lactic acid bacteria contained very small amounts of volatile flavour compounds; diacetyl was the most relevant component. Yeasts and the same qualitative headspace comp., but they differed quantitatively *S. cerevisiae* produced larger amounts of all the components that *C. boidinii*. Ethanol was the most abundant compound followed by acetaldehyde, n-propanol, hexanal. AS

MILK AND DAIRY PRODUCTS

639

Martin (JHJr) and Zall (RR). **Bioaugmentation in the treatment of dairy processing wastewaters.** *Dairy and Food Sanitation* 9(6): 1990: 295-303

The effectiveness of bioaugmentation in treating dairy processing wastewaters with the activated sludge process was evaluated in two lab. scale studies. Two commercially available bioaugmentation cultures recommended for these wastewaters were tested using synthetic dairy processing wastewater formulated from nonfat dry milk, dried sweet whey, and lightly salted butter. Four liter draw and fill reactors operated at a constant hydraulic residance time of five days without solids recycle were used. In the first study, the effectiveness of the two bioaugmentation cultures with two different background populations of microorganisms was compared using a low strength synthetic wasterwater formulation. There was little difference between control and bioaugmented reactors in mixed liquor and clarified effluent characteristics. Although all of the reactors produced effluents that were generally acceptable with respect to BOD_5 concn., removal of suspended solids by gravitational settling was marginal. In the second study, the effectiveness of the two bioaugmentation cultures in preventing the proliferation of filamentous microorganisms responsible for bulking sludge was evaluated using a higher strength wastewater formulation. Neither cultures was found to be effective in preventing the proliferation of these organisms and thus, the problem of bulking sludge. AS

640

Bhowmik (T) and Marth (EH). **Esterolytic activities of *Pediococcus* sp.** *Journal of Dairy Science* 72(11): 1989: 2869-2872

Intracellular esterase activity of *Pediococcus pentosaceus* and *Pediococcus acidilactii* were examined. Esterase activity was present only in case of *P. pentosaceus*. It was also confirmed by PAGE and histochemical staining. Highest esterolytic acidity was noted in *P. pentosaceus* NCDO. JSS

641

Bachman (LR) and Glatz (BA). **Protoplast production and regeneration in *Propionibacterium*.** *Journal of Dairy Science* 72(11): 1989: 2877-2884

Because of lack of methods of genetic exchange in the propionibacteria, production and regeneration of proteoplasts has been tried. *Propionibacterium freundenreichii* has been used. The population was obtained in the presence of lysozyme in a buffer that contained 0.5 M sucrose, 100 mM Tris-HCE, and 10 mM MgCl. Regeneration occured in sodium lactate agar supplemented with 0.5 M sucrose and 2.5% gelatin. The protoplast suspension was spread on to the surface or regeneration agar and overlaid with soft regeneration agar. Regeneration of the protoplasts took 21 to 26 days. Regeneration frequencies were generally in the range of 10-30% although frequencies as high as 85% were obtained. JSS

Milk

642

Panter (KE) and James (LF). **Natural plant toxicants in milk. A review.** *Journal of Animal Science* 68(3): 1990: 892-904

Elimination of plant toxicants via milk by lactating animals is considered a minor route of excretionk is important in the deficiency state, but when in excess it may cause toxicity to offspring. AS

643

Christopherson (AT) and Zottola (EA). **Growth and activity of mesophilic lactic acid streptococci in ultrafiltered skim milk and in reconstituted non-fat dry milk of differing tolal solids contents.** *Journal of Dairy Science* 72(11): 1989: 2856-2861

Four sp. of streptococci were used for comparing their growth activity in reconstituted skim milk in 8.3% and 15% (TS) against 8.9% TS of skim milk, and in UF concentrated skim milk of 12 and 13% TS. The incubation was done at 30 C for 15 to 18 h. Activity of the cultures was evaluated by measuring pH, titratable acidity as lactic acid and cell populations. The results suggest that UF concentrated skim milk is superior to reconstituted skim milk as a substrate for lactic acid bacteria and that skim milk retentates have potential for use as media for starter cultures. A mode for predicting developed acidity from solids content and from type of milk was determined by multiple regression analysis. JSS

644

Saidi (B) and Warthesen (JJ). **Analysis and stability of orotic acid in milk.** *Journal of Dairy Science* 72(11): 1989: 2900-2905

Heat stability of orotic acid in milk and kinetics of orotic acid loss during an industrial yoghurt fermentation has been studied using a waters model 6000 A HPLC. Orotic acid in milk was stable during heating but decreased during commercial yoghurt fermentation. Correlations were made between the loss of orotic acid and the increase or decrease in pH during fermentation. JSS

645

Hegazi (FZ). **Growth rate, proteolysis and acid production of** *Streptococcus faecalis* **subsp.** *liquefaciens* **in skim milk with some additives.** *Die Nahrung* 34(2): 1990: 195-199

Growth rate, proteolysis and acid production of *Strep. faecalis* subsp. liquefaciens were examined in skim milk with and without 0.15% calcium lactate, 0.03M Na, K phosphate, 5% calcium carbonate or 2-8% NaCl, at 20 C. Calcium lactate affected neither the growth rate nor the breakdown of casein. The highest acid production and degradation of casein occurred in phosphate-buffered skim milk (pH 7.1). Inorganic phosphate did not have any influence on the generation time and hydrolysis of casein. Calcium carbonate, on the contrary, slightly reduced the growth rate and the acid production: proteolysis was markedly decreased. Although 2% NaCl brought about ca. 17% reduction in the number of viable cells, it increased not only the breakdown of casein but the acid production during the exponential phase as well. Higher salt concn. inhibited growth, acid production and proteolysis. The effect increased with increasing the salt level. An adaptation period of 24 h followed by little growth was observed in milk containing 8% NaCl. AS

Milk products

Cheese

646

Joosten (HMLJ) and Northolt (MD). **Detection, growth and amine-producing capacity of lactobacilli in cheese.** *Applied and Environmental Microbiology* 55(9): 1989: 2356-2359

A differential plating medium was developed to detect decarboxylating lactobacilli in cheese. With this medium, 15 cheeses made from raw milk were investigated for the presence of these bacteria. Five histidine-decarboxylating strains and one tyrosine-decarboxylating strain were isolated. The isolates were identified with the API 50L system. Accordingly, each of the five histidine-decarboxylating strains was identified as *Lactobacillus buchneri*, whereas the tyrosine-decarboxylating strain is a representative of *Lactobacillus brevis*. Cheesemaking exp. using a low inoculum concn. of the histidine-decarboxylating *L. buchneri* strain St2A (0.2 CFU/ml of milk) showed that, under conditions of accelerated proteolysis, histamine may accumulate rapidly; after 3 months of ripening, 410 mg/kg was found. An inoculum concn. of 5 CFU/ml gave rise to the formation of 1,060 mg/kg. AS

647

Mohler Smith (A) and Nakai (S). **Classification of cheese varieties by multivariate analysis of HPLC profiles.** *Canadian Institute of Food Science and Technology Journal* 23(1): 1990: 53-58

Water extracts of Cheddar, Edam, Gouda, Swiss, and Parmesan cheeses were analyzed by HPLC with a reversed phase C8 column. Principal component and discriminant analyses were applied to 55 peak areas from each cheese chromatogram. Discriminant analysis on data from a single HPLC column was able to correctly classify cheese by var. at a 90% success rate. This classification rate dropped to 64% when data from 4 HPLC columns were combined, implicating the between-column variations are large. Average rate of correct classification calculated from the rates of 4 columns was 96.5% for the total of 106 cheese samples. Sensory tests carried out by a semi-trained panel correctly classified cheeses by var. at a 63% success rate for the same cheese samples. AS

648

Christopherson (AT) and Zotola (EA). **The use of whey, permeates as starter media in cheese production.** *Journal of Dairy Science* 72(11): 1989: 2862-2868

Permeate from Cheddar cheese whey was used as a medium for propagating several strains of mesophilic lactic acid streptococci. Propagations were carried out in whey permeate or whey permeate with 1.0% yeast extract. After each transfer, each culture was incubated for 16 to 18 h at 20 or 30 C. For each of three propagation conditions, a two-way analysis of variance was performed to assess the effects of culture type and day of propagation on growth or final pH. After seven transfers in the media, an activity test was performed on each of the cultures to determine whether viability had been retained. T-Tests were conducted to compare differences in final pH attained in each activity test among cultures which has been propagated in the different media. *Streptococcus lactis* C 8 and

Streptococcus cremoiris TR were propagated for 5 d in permeate from Swiss cheese whey. These cultures were used as starters for making Colby cheese from whole milk and UF whole milk retentate. Acid development as measured by pH was more dependent upon the type of streptococcal strain used and day of propagation than growth. The incubation temp. during the propagation exerted more of an effect on acid development in the activity test than the addition of yeast extract. The cheeses made with the permeate cultures had pH close to 5.0. Total mesophilic cell populations of 8.0 $\log_{10}$ cfu/ml were recovered from the cheeses through 4 month of storage at 10 C. AS

Cheddar cheese

649

Zhang (D) and Mahoney (AW). **Bioavailability of iron-milk protein complexes and fortified Cheddar cheese.** *Journal of Dairy Science* 72(11): 1989: 2845-2855

Cheddar cheese was fortified with ferric chloride or Fe casein, and Fe whey protein complexes. Fe bioavailability was measured by haemoglobin regeneration efficiency. Max. and basal Fe bioavailabilities were measured in anaemic weanling rats fed low Fe diets and normal adult rats fed high Fe diets, 22 mg Fe /kg and 145 mg Fe/kg resp. Max. Fe bioavailabilities for ferric chloride or Fe casein, ferripolyphosphate whey protein and Fe whey protein complexes were 85, 71, 72 and 72% resp., and for the respective Fe fortified cheeses they were 75, 66, 74 and 67%. Differences were not significant in max. Fe bioavailabilities among Fe sources and between fortified cheeses and fortification Fe sources. JSS

Yoghurts

650

Keller (SE), Newberg (SS), Krieger (TM) and Shazer (WH). **Degradation of aspartame in yoghurt related to microbial growth.** *Journal of Food Science* 56(1): 1991: 21-23

Three commercial yoghurt cultures and strains of *Lactobacillus bulgaricus* and *Streptococcus thermophilus* isolated therefrom were evaluated for their effect on aspartame degradation during and after fermentation. The rate of aspartame loss was related to growth of the organisms. Differences in losses due to strain type did not appear significant. Aspartame degradation rates were correlated to metabolic rate of culture. As the rate decreased, loss of aspartame decreased. As a result, 10% aspartame was degraded during 6 wk refrigerated storage. Results indicate aspartame should remain stable in yoghurt, provided it is added after fermentation. AS

MEAT AND POULTRY

651

Borzelleea (JF), Depukat (K) and Hallagan (JB). **Lifetime toxicity/carcinogenicity studies of FD and C Blue No. 1. (Brilliant blue FCF) in rats and mice.** *Food and Chemical Toxicology* 28(4): 1990: 221-234

FD and C Blue No.1 was fed to Charles River CD rats and CD-1 mice as a dietary admixture in lifetime toxicity/carcinogenicity studies. The rat study was conducted with an *in utero* phase in which the compound was administered to the F generation rats (60/sex/group) at dietary concn. of 0.0%, 0.0%, 0.1%, 1.0% or 2.0%. After randomly selecting the F animals, the lifetime phase was initiated were 116 and 111 wks for males and females, resp. The no-observed-adverse-effect levels are dietary concn. of 2.0% for males (1072 mg/kg body wt./day), and 1.0% for females (631 mg/kg/day) based on a 15.0% decrease in terminal body wt. and decreased survival in the high-dose females compared with the combined control groups. Charles River (CD-1 mice (60) sex/group) were fed FD and C Blue No. 1 as a dietary admixture at levels of 0.0%, 0.0%, 0.5%, 1.5% or 5.0% in a lifetime toxicity/carcinogenicity study. The max. exposure time was 104 wk for both males and females. No consistent, significant compound-related adverse effect were noted. The no-observed-adverse-effect level established in this study is a dietary concn. of 5.0% (7354 mg/kg/day and 8966 mg/kg/day for male and female mice, resp.) AS

652

Pham (CB) and Cheftel (JC). **Influence of salts, amino acids and urea on the non-enzymatic browning of the protein-sugar system.** *Food Chemistry* 37(4): 1990: 251-260

653

Hayashi (T), Biagio (R), Saito (M), Todoriki (S) and Tajima (M). **Effect of ionizing radiation on sterility and functional qualities of dehydrated blood plasma.** *Journal of Food Science* 56(1): 1991: 168-171

Meat

654

Gabriel Piette (JP) and Idziak (ES). **New method to study bacterial adhesion to meat.** *Applied and Environmental Microbiology* 55(6): 1989: 1531-1536

A new method was developed for the study of bacterial adhesion to meat surfaces. Thin slices of meat (40 MU m thick) were inserted into a specially designed observation chamber. The meat slices were then exposed to a bacterial suspension (ca 10^6 CFU. ml^{-1}) to initiate adhesion (20 min of contact time) and subsequently rinsed to eliminate nonadherent bacteria. Because of the special chamber design, the disruptive force exerted on the bacteria during rinsing (shear stress) was uniform over the whole surface of the meat slices, was constant, and could be varied from 0 to 0.08 N m^{-2}. After being rinsed, the meat slices were stained with basic fuschin and observed under light microscopy to determine the number and distribution of adherent bacteria. This new method was used to study the adhesion of *Acinetobacter* strain LS2, a *Lactobacillus* sp., and *Pseudomonas fluorescens* to slices of beef fat and tendon. At 25 C, most (greater than or equal to 99.9%) of the cells of the *Lactobacillus* sp. deposited on the meat were washed off the surface during rinsing (0.05 N m^{-2}), whereas a large number (ca. 10^5 CFU cm^{-2}) of *Acinteobacter* strain LD2 and *P. fluorescens* cells remained adherent. The extent of adhesion was similar on fat and tendon, and adherent bacteria were distributed evenly over the whole surface of the slices. This preliminary study indicates that the combined use of thin slices of meat and of then observation chamber provides us with the means to more accurately study bacterial adhesion to meat surfaces. AS

655

Swatland (HJ). **A review of meat spectrophotometry, (300 to 800 nm).** *Canadian Institute of Food Science and Technology Journal* 22(4): 1989: 390-402

Meat is an optically anisotropic translucent tissue that may show higher reflectance when the incident illumination is perpendicular to the muscle fibers than when it is coaxial. In meat that has been washed to remove chromophores, reflectance is almost a linear function of wavelength (from about 0.3 at 420 nm to about 0.75 at 700 nm). Myoglobin (Mb) and its derivatives are primarily responsible for selective absorbance in red meats. The Soret absorbance bands for deoxymyoglobin (DMb), oxymyoglobin is replaced by a strong absorbance band at 555 nm that in is replaced by a strong absorbance band at 578 nm and a slightly weaker band at 542 nm, although MMb formation generally masks this difference between reflectance at 542 and 578 nm. The relatively high myoglobin concn. of beef reduces the overall intensity of reflectance spectra to about one third of that of washed meat. Relative to the transmittance spectra of purified Mb derivatives, the reflectance spectra of intact meat are flatter, without sharp peaks, and are affected by a complex interaction between light scattering, selective absorbance and sample structure. Increases in the intensity of reflectance spectras occur with low meat pH and with cooking. Interactance spectra occur with low meat pH and with cooking. Interactance spectra obtained via optical fibers are compatible with reflectance spectra obtained by conventional reflectance spectrophotometers provided that methods of standardization and optical geometry are taken into account. 74 references. AS

656

Stanton (C) and Light (N). **The effects of conditioning on meat collagen. Part 3. Evidence for proteolytic damage to endomysial collagen after conditioning.** *Meat Science* 27(1): 1990: 41-54

657

Bauer (F) and Hofmann (K). **Influence of heat on solubility and electrophoretic behaviour of sarcoplasmic proteins of beef and pork.** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 190(3): 1990: 223-227 (De)

658

Arvanitoyannis (I). **The effect of storage of canned meat on concentration of the metals Fe, Cu, Zn, Pb, Sn, Al, Cd and Ni.** *Die Nahrung* 34(2): 1990: 147-151

A gradual increase in the concn. of Fe, Cu, Sn and Zn over a 2 yr period was noticed in canned meat in the order: pork bovine veal. BV

Beef

659

Tutuncu (MA), Ozilgen (M) and Ungan (S). **Weight loss behaviour of refrigerated and frozen beef and ground beef.** *Canadian Institute of Food Science and Technology Journal* 23(1): 1990: 76-78

660

Greer (GG), Jones (SDM), Dilts (BD) and Robertson (WM). **Effect of spray-chilling on the quality, bacteriology and case life of aged carcasses and vacuum packaged beef.** *Canadian Institute of Food Science and Technology Journal* 23(1): 1990: 82-86

661

Farouk (MM), Price (JF) and Salih (AM). **Effect of ferrous iron, cooking and shredded coffi^R** on thiobarbituric acid (TBA) numbers in ground beef. *Journal of Food Science* 56(1): 1991: 172-174

662

Ensor (SA), Sofos (JN) and Schmidt (GR). **Differential scanning calorimetric studies of meat protein-alginate mixtures.** *Journal of Food Science* 56(1); 1991; 175-179, 190

663

Barbut (S) and Findlay (CJ). **Influence of sodium, potassium and magnesium chloride on thermal properties of beef muscle.** *Journal of Food Science* 56(1); 1991; 180-182

664

Chao (RR), Mulvaney (SJ), Bailey (ME) and Fernando (LN). **Supercritical carbon dioxide conditions affecting extraction of lipid and cholesterol from ground beef.** *Journal of Food Science* 56(1); 1991; 183-187

665

Romijn (A), Cuppett (SL), Zeece (MG), Parkhurst (AM) and Lee (ML). **Impact of soy protein isolates and specific fractions on rancidity development in a cooked, refrigerated beef system.** *Journal of Food Science* 56(1); 1991; 188-190

666

Dickson (JS). **Control of** *Salmonella typhimurium*, *Listeria monocytogenes*, and *Escherichia coli* **0157:H7 on beef in a model spray chilling system.** *Journal of Food Science* 56(1); 1991; 191-193

667

Mitsumoto (M), Faustman (C), Cassens (RG), Arnold (RN), Schaefer (DM), Scheller (KK). **Vitamins E and C improve pigment and lipid stability in ground beef.** *Journal of Food Science* 56(1); 1991; 194-197

668

Unda (JR), Molins (RA) and Walker (HW). *Clostridium sporogenes* and *Listeria monocytogenes*: **Survival and inhibition in microwave-ready beef roasts containing selected antimicrobials.** *Journal of Food Science* 56(1); 1991; 198-205, 219

Beef steaks

669

Strange (ED) and Whiting (RC). **Effects of added connective tissues on the sensory and mechanical properties of restructured beef steaks.** *Meat Science* 27(1); 1990; 61-74

Mutton

Sheep

Lambs

670

Moore (VJ). **Effect of tray liners on the drip loss of lamb chops during retail display.** *Meat Science* 27(1); 1990; 87-90

The amount of drip lost by lamb chops during display was affected by the type of tray liner used. In one study involving chilled and frozen/thawed meat, the use of an absorbent paper liner increased the drip loss and influenced whether or not the quantity of drip was affected by freezing/thawing. In another study, thawed chops held for 24 h on plastic coated trays without liner or on a plastic coated liner had less than 2% drip loss, whereas adjacent chops from the same loin processed and held in the same way but displayed on liners of absorbent paper or paper pouches of diatomaceous earth lost 4.3% and 5.6% drip, resp. This effect of the material in contact with the meat should be considered when reporting drip loss data and when comparing results with those of other researchers. AS

Pork

671

Girard (B), Vanderstoep (J) and Richards (JF). **Residual pinkness in cooked turkey and pork muscle.** *Canadian Institute of Food Science and Technology Journal* 22(4); 1989; 372-377

672

Irving (TC), Swatland (HJ) and Millman (BM). **Effect of pH on myofilament spacing in pork measured by X-ray diffraction.** *Canadian Institute of Food Science and Technology Journal* 23(1); 1990; 79-81

673

Berg (I), Overvik (E) and Gustafsson (JA). **Effect of cooking time on mutagen formation in smoke, crust and pan residue from pan-broiled pork.** *Food and Chemical Toxicology* 28(6); 1990; 421-426

674

Reitmeier (CA) and Prusa (KJ). **Composition, cooking loss, colour and compression of ground pork with dry- and wet-milled corn germ meals.** *Journal of Food Science* 56(1); 1991; 216-219

Rabbit

675

Civera (T), Julini (M), Quaglino (G) and Ferrero (E). **Assessment of meat quality in rabbits**

slaughtered by means of different stunning methods. *Industrie Alimentari* 28(271): 1989: 492-495, 500 (It)

Products

Meat

676

Glass (KA) and Doyle (MP). **Fate of *Listeria monocytogenes* in processed meat products during refrigerated storage.** *Applied and Environmental Microbiology* 55(6): 1989: 1565-1569

The fate of *Listeria monocytogenes* during refrigerated storage was determined on several processed meat products, including ham, bologna, wieners, sliced chicken, sliced turkey, fermented semidried sausage, Bratwurst, and cooked roast beef. The meats were surface inoculated with a five-strain mixture of less than equal to 200 or ca. 10^5 *L. monocytogenes* cells per package, vacuum packaged, and stored at 4.4 C. Survival or growth of Listeria was determined for up to 12 wks of storage or untill the product was spoiled. The organism survived but did not grow on summer sausage, grew only slightly on cooked roast beef, grew well on some wiener products but not on others, grew well (10^3 to 10^4 CFU/g increase within 6 wks) on ham, bologna, and Bratwurst, and grew exceptionally well (10^3 to 10^5 CFU/g increase within 4 wks) on sliced chicken and turkey. The rate of growth depended largely upon the type of product and then pH of the product. Growth was most prolific on processed poultry products. The organism generally grew well on meats near or above pH 6 and poorly or not at all on products near or below pH 5. These results indicate the importance of preventing postprocessing contamination of *L. monocytogenes* in a var. of ready-to-eat meat products. AS

677

Stekelenburg (FK), Zomer (WLJM) and Mulder (S). **A medium for the detection of bacteria causing green discolouration of cooked cured meat products.** *Applied Microbiology and Biotechnology* 33(1): 1990: 76-77

A cooked haemoglobin medium was developed for detection of hydrogen-peroxide-producing bacteria. The comp. and preparation of this medium are described. The medium has proved to be an adequate medium for diagnosis of the greening of cooked cured meat products caused by hydrogen-peroxide-producing lactic acid bacteria. AS

678

Vidal-Carou (MC), Izquierdo-Pulido (ML), Martin-Morro (MC) and Marine-Font (A). **Histamine and tyramine in meat products. Relationship with meat spoilage.** *Food Chemistry* 37(4): 1990: 239-249

Biogenic amines in processed meat products can be useful as indices of poor-quality raw material, but they can also be related with microbial activity involved in fermentation processes. This paper provides new data on this topic. Histamine, tyramine and pH changes were followed during storage/spoilage of beef and pork at both room and refrigerated temp. A notable increase in the content of amines was observed at both temp. studied. A greater and more rapid formation of histamine and tyramine took place in pork than in beef. The increase in the amines occurred before the increase in pH value. A preliminary study about the influence of ripening on histamine and tyramine contents was also carried out. This process seems to exert a greater influence on histamine than on tyramine content. Finally, the histamine and tyramine contents of 63 Spanish meat products were determined. Both amines were detected in all samples, but concn. varied greatly. Uncooked and ripened meats showed statistically significant higher amounts of both amines than cooked meat products. In cooked meat products, histamine values ranged from 0.25 to 3.90 mg/kg and tyramine from 0.50 to 25.6 mg/kg. For uncooked and ripened meat products, the range of histamine was from 0.25 to 249 mg/kg and of tyramine from 0.45 to 510 mg/kg. AS

679

Zijderveld (NHG) and Koolmees (PA). **Utility of immunohistochemical identification of muscle proteins in microstructural studies of comminuted meat products.** *Meat Science* 27(1): 1990: 55-60

Sausages

680

Mittal (GS), Wang (CY) and Usborne (WR). **Thermal properties of emulsion type sausages during cooking.** *Canadian Institute of Food Science and Technology Journal* 22(4): 1989: 359-363

Thermal conductivity, thermal diffusivity and specific heat of uncooked (25 C), and cooked (at 45 and 65 C) meat emulsions were studied at five moisture contents and protein ratios using central rotable composite design. Increasing moisture content from 50% to 70% increased both thermal conductivity (26%) and diffusivity (18 to 23%). Increasing the fat-protein ratio from 1 to 3 reduced the thermal diffusivity (10 to 16%) and thermal

conductivity (5%), but not the specific heat. On cooking, the thermal conductivity increased by 12% and specific heat decreased by 5%. Regression models for these relationships were developed. AS

681

DeMasi (TW), Wardlaw (FB), Dick (RL) and Acton (JC). **Nonprotein nitrogen (NPN) and free amino acid contents of dry, fermented and nonfermented sausages.** *Meat Science* 27(1): 1990: 1-12

Fermented and nonfermented sausages were analyzed for concn. changes in total and nonprotein nitrogen (NPN) and in free amino acid profiles during processing. Sausages fermented by *Pediococcus pentaceous* at 38 C and heated to 60 C had increases (P 0.05) in total N and NPN contents and increases in concn. (greater than or equal to 5 mg per 100 g dry sample) for 14 of 20 free amino acids. Nonfermented sausages had no increase (P 0.05) of NPN content and increases in only 6 of 20 free amino acids after heating to 60 C. When the effects of three starter cultures were compared, NPN concn. after fermentation and heating and after drying were highest to lowest in the following orderried sausages. Overall, these results for rapidly fermented and mildly heated dry sausages were similar to results previously reported for European-style dry sausages processed with prolonged low temp. fermentations. AS

682

Girard (JP), Culioli (JH), Maillard (T), Denoyer (C) and Touraille (C). **Influence of technological parameters on the structure of the batter and the texture of frankfurter type sausages.** *Meat Science* 27(1): 1990: 13-28

The aim of the study was, on the one hand, to determine the relationships between various technological factors, the structure of the batters and the texture characteristics of frankfurter type sausages, and, on the other, to define the possibilities of realizing a reference scale for texture. The addition of NaCl in the 0.2% range induces a large increase (60%) in the cooking yield, a decrease in the sp. gr. and an increase in the viscosity of the batter determined indirectly through the evolution of the product temp. during chopping. These variations together, give a 30% decrease in mechanical firmness and a 100% and 90% increase in the juiciness and elasticity of the final products, resp. However, beyond 2%, NaCl does not induce any significant effect on these characteristics. The addition of caseinate in a 1.3% range induces a degassing of the batter and a 10-37% decrease in the water losses during cooking. The higher the caseinate content in the 0-6% range, the larger the rise in the batter temp. during chopping. Sausages are also considered harder (+22%) and less juicy and elastic (-50%) when caseinate content increases. Addition of 0.1-0.5% polyphosphates and chopping under vacuum (0.2 atm) induce variations in the cooking yield, + 3% and -1%, resp. but have no influence on the texture of the final products. Modifications of all these technological parameters induced variations by a factor of 2 in the different mechanical parameters and in parallel differences of 1-2 points on a 6 point scale for sensory characteristics. AS

Poultry

Chickens

683

Xiong (YL) and Brekke (CJ). **Protein extractability and thermally induced gelatin properties of myofibrils isolated from pre- and postrigor chicken muscles.** *Journal of Food Science* 56(1): 1991: 210-215

Purified chicken myofibrils were suspended in 0.6M NaCl at various pH values to study gelation properties of the myofibrils. Postrigor breast myofibrils showed a greater protein extractability and gel strength than prerigor breast myofibrils, but the reverse was found for leg myofibrils. Salt-soluble protein was least extractable at pH 5.50 for both breast and leg myofibrils. The pH for optimum gelation, indicated by increased penetration force, was 6.00 for breast and 5.50 for leg myofibrils. Heating at 1 C/min from 20 to 70 C produced stronger breast but weaker leg myofibril gels than isothermal heating at 70 C for 20 min. Muscle rigor state showed a greater effect on protein extractability and gel strength for breast myofibrils than for leg myofibrils. AS

Broilers

684

Chambers (JR), Fortin (A), Mackie (DA) and Larmond (E). **Comparison of sensory properties of meat from broilers of modern stocks and experimental strains differing in growth and fatness.** *Canadian Institute of Food Science and Technology Journal* 22(4): 1989: 353-358

Sensory properties of dark and white meat from broilers of modern (1980) and experimental strains (A and K) which differed in growth rate and carcass fatness were compared. The role of age, wt., and carcass fatness in accounting for sensory property differences, were examined. Faster-growing, modern broilers had meat that was either similar or

more intense in sensory properties when compared to meat of experimental-strain broilers of similar age. The former had dark meat with the most intense flavour and most tenderness. Dark-meat flavour intensity was highest for modern stocks, lower for strain A and lowest for strain K, which grew most slowly. Hence, dark meat flavour intensity increases with broiler size. Experimental-strain broilers slaughtered at later ages, had dark meat with more intense flavour and less tenderness than meat from similar broilers slaughtered at 47 days of age. Fatter carcasses had more intensely flavoured, juicier and more tender dark meat as well as juicier white meat; however, carcass fatness accounted for only small portions (8%) of trait variation. Carcass fatness of broilers can be reduced with little effect on the sensory properties of broiler meat. AS

Turkeys

685

Maas (MR), Glass (KA) and Doyle (MP). **Sodium lactate delays toxin production of *Clostridium botulinum* in cook-in-bag turkey products.** *Applied and Environmental Microbiology* 55(9): 1989: 2226-2229

Comminuted raw turkey, containing 1.4% sodium chloride, 0.3% sodium phosphate, and 0 (control), 2.0, 2.5, 3.0, 0 or 3.5% sodium lactate, was inoculated with a 10-strain mixture of proteolytic type A and B *Clostridium botulinum* spores. The inoculated turkey was vacuum packaged and cooked by immersion in heated water to an internal temp. of 71.1 C. Samples were incubated at 27 C for up to 10 days. Five samples per treatment were examined for botulinal toxin at specific intervals. Sodium lactate exhibited an antibotulinal effect which was concn. dependent. Processed turkey containing 0, 2.0, 2.5, 3.0, or 3.5% sodium lactate was toxic after 3, 4 to 5, 4 to 6, 7, or 7 to 8 days, resp. Subsequent studies with a broth medium revealed that lactate, not the sodium ion, was the principal factor in delaying boutlinal-toxin formation . AS

686

Chambers (B), Chambers (EIV), Bowers (JAR) and Craig (JA). **Sensory detection and population thresholds for sodium tripolyphosphate in cooked ground turkey patties.** *Journal of Food Science* 56(1): 1991: 206-209

Sodium tripolyphosphate (STP) at levels of 0.1, 0.2, 0.3, 0.4, and 0.5% by wt. was added to ground turkey meat to determine if a flavour difference could be detected when STP was present. Detection thresholds for STP in ground turkey meat were determined for 30 female respondents Two population thresholds were determined using information from the detection thresholds. Two-thirds of the respondents detected a difference between samples with no STP and those with 0.5% STP or less. STP added at 0.3% was undetected by 50% of the tested population. AS

Poultry products

Eggs

687

Bianchi (E), Amendola (F) and Riccardi (S). **Meticlorpindol residues in eggs.** *Industrie Alimentari* 28(271): 1989: 518-520 (It)

A simple and rapid HPLC method is used to determine the meticlorpindol residues in chicken eggs. Meticlorpindol residues was found in 13.27% of the samples tested (130 samples) with maximal values of 205 p.p.b. BV

Egg yolks

688

McCannel (AA) and Nakai (S). **Separation of egg yolk immunoglobulins into subpopulations using DEAE-ion exchange chromatography.** *Canadian Institute of Food Science and Technology Journal* 23(1): 1990: 42-46

The separation of egg yolk immunoglobulins into subpopulations was possible using DEAE-ion exchange chromatography. Based on radial immunodiffusion, 32.3% of the applied immunoglobulins did not bind to the DEAE-Sephacel column under the conditions chosen; 20.2% were eluted by a slight increase in phosphate concn.; and 27.0% required even higher concn. of phosphate for removal. Examination of antibody activity toward *Escherichia coli* lipopolysaccharide and β-lactoglobulin indicated that these specific antibodies were eluted at an earlier stage from the amino exchange column than immunglobulins with lower specificity to the antigens. The study indicated that egg yolk may contain an unidentified protein with mol. wt. similar to chicken IgG heavy chain, or may contain active as well as non-active IgG which carries a different charge. AS

SEAFOODS

Crabs

689

Hollingworth (TAJr), Kaysner (CA), Colburn (KG),

Sullivan (JJ), Abeyta (CJr), Walker (KD), Torkelson (JDJr), Throm (HR), Wekell (MM). **Chemical and microbiological analysis of vacuum-packed, pasteurized flaked imitation crabmeat.** *Journal of Food Science* 56(1): 1991: 164-167

Various procedures were used to attempt to correlate spoilage of imitation crabmeat with sensory analysis after storage at 4, 10 and 22 C. Total volatile acids, total volatile bases, cadaverine, putrescine, histamine, aerobic plate count, correlated well with product spoilage at 22 C. Even though 22 C is considered abusive, the only pathogenic organism isolated was *Bacillus cereus*. In contrast 4 C and 10 C, neither the chem. nor microbial indicators were adequate to assess quality of the product. Thus sensory analysis, despite its limitations, remained the only method currently available to assess product acceptability after prolonged storage at reduced temp. AS

Lobster

690

Chen (JS), Rolle (RS), Marshall (MR) and Wei (CI). **Comparison of phenoloxidase activity from Florida spiny lobster and Western Australian lobster.** *Journal of Food Science* 56(1): 1991: 154-157, 160

Shrimps

691

Pasquel (LJDR) and Babbitt (JK). **Isolation and partial characterization of a natural antioxidant from shrimp** (*Pandalus jordani*). *Journal of Food Science* 56(1): 1991: 143-145

The nature of a natural antioxidant present in shrimp was investigated. From several solvents used in the extraction process, ethanol proved most effective. A diethyl ether extract exhibited no antioxidant activity. The compound responsible for the antioxidant effect was present in very low concn. in its natural source. The chem. characteristics and chromatographic properties suggested that it was a polyhydroxylated derivative of an aromatic amino acid. AS

Squids

692

Ohashi (E), Okamoto (M), Ozawa (A) and Fujita (T). **Characterization of common squid using several freshness indicators.** *Journal of Food Science* 56(1): 1991: 161-163, 174

Changes in several components and properties were examined to find appropriate indicators of freshness of common squid during storage at 0, 5 and 10 C. Total viable counts of bacteria, pH and volatile basic nitrogen did not change significantly during 2 wk storage at 0 C. Unlike usual fish meat, K value in squid muscle changed very quickly, but Hx/AMP ratio was a better indicator. Agmatine increased before initial decomposition started but was not suitable as an early freshness indicator. Free basic amino acids, arginine and ornithine also changed rapidly. Basic amino acids such as arginine and ornithine appeared to be appropriate indicators of freshness of common squid. AS

Fish

693

Mulchandani (A), Male (KB) and Luong (JHT). **Development of a biosensor for assaying postmortem nucleotide degradation in fish tissues.** *Biotechnology and Bioengineering* 35(7): 1990: 739-345

An enzyme sensor system has been developed to assess the freshness level in fish tissue. The system was designed to measure the K value, the concn. ratio of [Hx + HxR] and [Hx + HxR + IMP], where Hx, HxR, and IMP are hypoxanthine, inosine and inosine-5'-monophosphate, resp. The [Hx + HxR] concn. in tissue extract was measured by nucleoside phosphorylase and xanthine oxidase immobilized on a preactivated nylon membrane and attached to the tip of a polarographic electrode. The electrode amperometrically detected the products of degradation, hydrogen peroxide and uric acid. For detn., of [IMP + HxR + Hx], IMP was first converted to HxR by nucleotidase immobilized on the wall of a polystyrene tube. The enzyme electrode consisting of nucleoside phosphorylase and xanthine oxidase provided excellent reproducible results for at least 40 repeated assays and immobilized nucleotidase was good for at least 40 assays as well. The *K* value for each sample could be determined in Ca. 10 min. When applied to *K* value measurements in several fish meats, the results obtained agreed well with those obtained by the conventional enzymatic method. AS

694

Zee (JA), Poirier (D), Cusson (M), Roberge (AG) and Sevigny (J). **Nutritional values of some fish and seafood produced and consumed in Quebec.** *Canadian Institute of Food Science and Technology Journal* 23(1): 1990: 66-71

695

Hodson (GC), Scotter (MJ) and Wood (R). **Methods of analysis for the determination of ice-glaze for fish products. Collaborative trail.** *Journal of the*

Association of Public Analyst 27(3): 1989: 85-108

Samples of cod and plaice fish fillets, cold and warm water prawns, cockles, scampi and scallops containing controlled amounts of glaze were analysed at twelve lab. in a collaborative trail. Under ideal conditions used in trail, the methods for estimating the amount of glaze showed considerable variation with respect to accuracy and prediction. However, when the data are presented in terms of fish content, the performance of the cod and Lancashire count council methods is such that they may be recommended for use on an interim basis for fish fillets and prawns. SRA

696

Yano (T). **Kinetic study on gelation of fish meat sol.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 37(3): 1990: 220-223 (Ja)

Kinetic study on the gelation of fish meat sol was performed with an assumed reaction sequence to program the software for control of gel strength of kamaboko. Four different states, raw, gelation-possible, gelation-impossible and gelled state, were assumed for fish meat sol during the heating process of kamaboko. Raw state was changed into gelation-possible one, and then changed into gelation-impossible or gelled one. Parameters for the reactions were estimated to minimize the sum of the squares of the differences of computed value from corresponded data value. At higher temp. than 32.9 C, the rate of the reaction from gelation-possible state to gelation-impossible one was higher than that from raw to gelation-possible one. Simulations were tried with the estimated values, and the results could explain the relationship between heating condition and gel strength successfully. AS

697

Vidal-Carou (MDC), Veciana-Nogues (MT) and Marine-Font (A). **Spectrofluorometric determination of histamine in fish and meat products.** *Journal of the Association of Official Analytical Chemists* 73(4): 1990: 565-567

A method has been developed for spectrofluorometric detn. of histamine in fish and meat products. After a perchloric extract is obtained from samples, histamine is extracted with n-butanol and transferred to hydrochloric acid. Finally, histamine is subjected to a condensation reaction with o-phthalaldehyde (OPT). The method was tested for lack of interference from other amines. Precision of the method in fish products was 6.60% CV and recovery was 96.50%. In meat products, precision was 5.42% CV and recovery was 96.20%. By analysis of variance (P = 0.05), no significant statistical differences were found for recovery values vs histamine content in both foods. AS

698

Wekell (JC) and Barnett (H). **New method for analysis of trimethylamine oxide using ferrous sulphate and EDTA.** *Journal of Food Science* 56(1): 1991: 132-135, 138

In the analysis of trimethylamine oxide (TMAO) in fish tissues, an equimolar mixture of ferrous sulphate and disodium ethylenediaminetetraacetic acid (EDTA) (0.1 M) in acetate buffer(0.8 M, pH 4.5) was found to be satisfactory replacement for titanium chloride. The titanium chloride method for TMAO was usually conducted at 80 C; the ferrous sulphate-EDTA reaction at 50 C appeared complete in 5 min and yield comparable results. The use of an acetate buffer alleviated any interference from the trichloroacetic acid used for extraction of TMAO and trimethylamine (TMA) from fish tissue. AS

699

Yen (G-C) and Hsieh (C-L). **Simultaneous analysis of biogenic amines in canned fish by HPLC.** *Journal of Food Science* 56(1): 1991: 158-160

A simple HPLC method was developed for simultaneous detn. of putrescine, cadaverine, tryptamine, 2-phenylethylamine, spermidine, spermine, histamine, tyramine, and agmatine. Amines were derivatized with benzoyl chloride and seperated well on Lichrosphere are 100 RP-18 column using a gradient elution system with a mixture of methanol and water in 10 min. Amine content of canned fish was detected by this method, and except for anchovie products most samples contained the 9 amines at low levels. This method would be useful for detection of amines in fish. AS

Anchovies

700

Castanon (CA) and Barral (AO). **On-board handling and preservation of anchovy** (*Engraulis anchotia*) **catches.** *International Journal of Refrigeration* 13(3): 1990: 203-206

The anchovy of the Argentine Sea is an under-exploited resource due to the effect of economic and technological factors. Any proposal to increase the exploitation of this resource must consider on-board handling and preservation of the catch as critical points because the characteristics of the fish (high lipid contents, muscle fragility and a tendency to ventral brusting) make it a technologically fragile sp. Three different on-board

handling and preservation conditions are reviewed in this paper: (a) in bulk at environmental temp. (12 C); (b) in boxes with flake-ice, stored in a chamber at 0 C; and (c) in bulk inside insulated containers with a mixture of sea water and ice. Two tests were carried out aboard the INIDEP's R.V. Dr. Eduardo L. Holmbery; in both instances the three conditions under consideration were simultaneously tried out with fish from the same catch. The variations of organoleptic assessment, total volatile basis, rancidity, moisture, chloride content and bacterial load were assessed for different storage periods. The results indicate that storage as in method (c) was the best of the three techniques assessed. AS

Hakes

701

Montero (P) and Borderias (J). **Behaviour of myofibrillar proteins and collagen in hake** (*Merlucclus merlucclus* L.) **muscle during frozen storage and its effect on texture.** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 190(2): 1990: 112-117

Mackerels

702

Chang (C-M), Ohshima (T), Koizumi (C) and Wada (S). **Influence of freeze-thawing process on the quality of mackerel during storage at -1 C.** *Bulletin of the Japanese Society of Scientific Fisheries (Nihon Suisan Gakkai-shi)* 55(12): 1989: 2129-2135 (Ja)

Fresh round mackerel was frozen at -20 C, subsequently stored at the same temp. for 100 days, thawed in tap water, and stored again at -1 C for 30 days. During storage VBN content, K value, TBA value, free amino acid comp., lipid class comp., and fatty acid comp. of lipids in the white muscle of fish were determined at an appropriate interval and compared with those of the unforzen fish which was stored under the same conditions, i.e. at -1 C. The results obtained showed that the freeze-thawing process slighlty accelerated deterioration in freshness of fish during storage at - 1 C. Oxidation and enzymatic degradations of lipids during storage were also accelerated by this processing during subsequent storage. Contents of most free amino acid increased during storage, while that of histidine decreased. The rate of increase in the content of each of the free amino acids was higher in the freeze-thawed sample than in the unfrozen sample. These deterioration in the quality of freeze-thawed fish seems to be due to disruption of membranes and other tissue structures of the fish flesh caused by freeze-thawing process. AS

Sardines

703

Haugura (Y), Watanabe (H), Ishikawa (M) and Sakai (Y). **An application of cryo-shattering to low-fat meat separation from whole fish of mackerel and sardine.** *Bulletin of the Japanese Society of Scientific Fisheries (Nihon Suisan Gakkai-shi)* 55(12): 1989: 2119-2122

Collecting low-fat meat from whole fish by use of cryo-separation which consists of cryo shattering followed by cryo-sieving was studied in an attempt to pave the way for the acceptance of sardines and mackerels for human food. The segregated portions of mackerel, i.e. the light muscle, dark muscle, and viscera were shattered one by one at selected low temp. The particle size distribution of shattered tissues deeply depended on the temp. of shattering. At -60 C., the light muscle, the leanest among the portions, was ground into finer particles than that of the other portions. The relationship between the particle size and the fat content of particles, obtained through cryo-shattering of whole mackerels and sardines, showed various patterns depending upon shattering temp. Fortunately, however, a simple relationship in which the fat content of particles decreased with the reduction in particle size was obtained at -60 C for mackerel and at -80 C for sardine. The max. recoveries of low-fat meat (light muscle equivalent) were 95% for mackerel and 89% for sardine. AS

704

Nonaka (M), Hirata (F), Saeki (H), Nakamura (M) and Sasamoto (Y). **Gel forming ability of highly nutritional fish meat for foodstuff from sardine.** *Bulletin of the Japanese Society of Scientific Fisheries (Nihon Suisan Gakkai-shi)* 55(12): 1989: 2157-2162 (Ja)

A new type fish meat for foodstuff, tentatively named highly nutritional fish meat (NHFM), was processed from sardines by adopting a high-speed centrifugation of ground meat suspended in a small vol. of alkaline solution. The gel-forming ability of HNFM was compared with that of ordinary surimi made from the same lot. HNFM was ground with 3% NaCl and submitted to the *suwari* process at 30 C for 90 min, then the material was heated at 90 C for 30 min. Breaking strength and breaking strain of kamaboko thus obtained were measured with rheometer and the whiteness was evaluated with a chromatic meter. The gelling properties of kamaboko formed from HNFM were superior to those from the ordinary surimi, i.e., breaking strength of the former ranging from 800 to 1,000 g was as much as 30% greater than that of the later, breaking strain was 12-13 mm, and the whitness

was as high as 20%. The gel-forming ability of HNFM tended to reduced with an increase of its lipid content. AS

705
Careche (M) and Tejada (M). **Effect of neutral and oxidized lipids on protein functionality in megrim** (*Lepidorhombus whiffiagonis* **W.) and sardine** (*Sardina pilchardus* **R.) during frozen storage.** *Food Chemistry* 37(3): 1990: 275-287

The effect of added cod liver oil and oxidized cod liver oil on protein solubility, apparent viscosity and emulsifying capacity was measured during frozen storage (-18 C) of vacuum packed minced muscle of two non-dimethylamine (DMA)-forming sp., megrim (*Lepidorhombus whiffagonis* W) and sardine (*Sardinia pilchardus* R.). The aim was to establish the role of both unoxidized and oxidized lipids in protein functionality in the absence of interference due to the effect of formaldehyde on the proteins. The results showed that, with the addition of cod-liver oil (CLO), the three protein functional properties were equal to or oxidized cod-liver oil (OCLO) added showed lower protein solubility and viscosity, whereas the emulsifying capacity values were higher than in the controls. Hence, in non-DMA-producing fish sp., no protective effect on fish protein can be attributed to neutral lipids. AS

706
Huidobro (A), Montero (P), Tejade (M), Colmenero (FJ) and Jovier Borderias (A). **Changes in protein function of sardines stored in ice with and without added salt.** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 190(3): 1990: 195-198

In some Southern European countries, it is common practice to add varying quantities of salt to the ice used to cool and preserve the sardine, so as to improve its texture and allow longer storage. Considering that sardine stored in this way may be used in the manufacture of a number of different products, the effects of salt in the ice were investigated, with reference to functional properties such as protein solubility (PS), emulsifying capacity (EC) and apparent viscosity (n_{app}). The added salt significantly increased (P less than or equal to 0.05) the salt content of the muscle, bringing about an initial reduction in protein solubility and a decrease in EC and n_{app} as storage time progresses. In the absence of salt, these two functional properties remain constant or are enhanced. Thus, although salt permits prolonged storage, protein functions are reduced in sardine treated in this way to that in non-salted sardine, making the salted sardine is less suitable for subsequent use in different technological processes. AS

707
Watabe (S), Kamal (M) and Hashimoto (K). **Postmortem changes in ATP, creatine phosphate, and lactate in sardine muscle.** *Journal of Food Science* 56(1): 1991: 151-153

Tunas

708
Paleari (MA), Soncini (G) and Beretta (G). **Smoked tuna, sliced and vacuum packed, a relatively new products.** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 190(2): 1990: 118-120

The possibility of storing vacuum packed, smoked and sliced tuna fish was studied. The microbiological and chem. analyses indicated that hygienic conditions and sensory properties remain unaltered after storage at 5 C for 60 days. AS

Products

709
Aoki (T) and Kunisaki (N). **Content of ortho- and poly- phosphates in surimi-based products.** *Bulletin of the Japanese Society of Scientific Fisheries (Nihon Suisan Gakkai-shi)* 55(12): 1989: 2167-2171 (Ja)

Polyphosphate were widly used in surimi-based products in order to improve the quality. The ortho- and poly-, and total P contents in the 28 kinds of surimi-based products collected in the commercial market in Tokyo were analysed. Ortho- and poly-phosphate were extracted with water from each sample and were determined separately by the modified method of Fiske-Subba Row. The total P content in surimi-based products was determined after the sample was burnt at 550 C. The results obtained are as follows: The average contents of ortho-, poly-, and total P in surimi-based products were 38.0, 16.0, and 96.5 mg/100 g resp. The values obtained were equivalent to 120 and 63.3 mg/100 g wet wt. orthophosphate and sodium triphosphate, resp. The contents of these phosphates were quite different in each product analyzed. AS

PROTEIN FOODS

Infant foods

710
Fatoki (OS) and Bamiro (FO). **Levels of Na, K, Ca and Mg in infant formulae and in corn-flour infant feeds.** *Food Chemistry* 37(4): 1990: 269-273

Eight different brands of popular infant formulae and two corn-flour infant feed var. commonly consumed in Nigeria were analyzed for Na, K, Ca, Mg, using the SP-9 atomic absorption spectrophotometer. Results obtained showed that high amounts of Na, K and Ca (Na, 1.8-3.5, K, 4.1-7.5 and Ca 1.2-6.0 mg g^{-1} formula, resp.) and low amounts of Mg (Mg, 0.5-0.9 mg/g^{-1} formula) are present in the infant formulae. The corn-flour types have considerably lower amounts of these mineral elements (Na, 0.3-0.4, K, 0.3-0.5, Ca, 0.2 and Mg, 0.2-0.3 mg g^{-1} flour, resp.). AS

ALCOHOLIC AND NON-ALCOHOLIC BEVERAGES

711
Romisch (P). **System structures fit for automation.Explained by example of filling plants for beverages.** *Lebensmittelindustrie* 36(3): 1989: 118-120 (De)

The patented novel coupling units for the reorientation of the bottle stream, make possible the low-noise and space-saving realization of the following process sequence in the bottle department of beverage filling plants and separation-storage-collecting. AS

Alcoholic beverages

Beer

712
Hansen (M), Rocken (W) and Emts (CC). **Construction of yeast strains for the production of low carbohydrate beer.** *Journal of the Institute of Brewing* 96(3): 1990: 125-129

Somatic hybridisation of a larger brewing strain *Saccharomyces diastaticus*, through protoplast fusion was used to breed a hybrid yeast which was suitable for production of low carbohydrate beer. The hybrid bred was characterised based on OFAGE technique incombination with Ty-hybridisation. The yeast developed could not hydrolyse alpha-1-6 bonds of dextrins hence was suitable only for production of low carbohydrate beer and not diabatic beer. NGM

713
Ackermann (R) and Grutzmacher (J). **Yeast technology and further factors of influence on fermentation and maturing of beer. Part. II.** *Lebensmittelindustrie* 36(6): 1989: 270-272 (De)

The metabolism of brewer's yeast in connection with selected ingredients of the wort, as assimilatable N compounds, content of oxygen, opaqueness and germs, and fundamental parameters of fermentation and maturing of the beer, as temp. variation, fermentation speed and difference of the fermentation rate are the aspects covered. BV

714
Waeschke (H), Rodicker (H) and Kodura (I). **Cleaning of effluents from breweries by ultrafiltration.** *Lebensmittelindustrie* 36(6): 1989: 272-274 (De)

The authors examine the possibilities of cleaning effluents from breweries by ultrafiltration, so that it will be free of yeast and poor of bacteria and will contain low amounts of reducing matter only. AS

715
Schulz (R), Johring (A) and Kunte (J). **Microbiological process measurement in the brewing industry. Present status and trends.** *Lebensmittelindustrie* 26(6): 1989: 275-277 (De)

716
Buckee (GK). **Estimation of iso-alpha-acids in beer by HPLC collaborative trial.** *Journal of the Institute of Brewing* 93(6): 1990: 143-148

A procedure based on HPLC for estimation of iso-alpha-acids in beer carried out in a collaborative programme of IOB has been described. The iso-alpha-acids of beer are absorbed on to a C_{18} B and Elute column and then selectively desorbed prior to isocractic analysis by HPLC using eluting solvent system consisting of methanol:water:phosphoric acid:tetrabutyl ammonium hydroxide and a C_{18} radial pals cartridge. Although the method was not sufficiently precise to adoption as a recommended method, it has the advantage of measuring bitterness in terms of iso-alpha-acids is suggested as an alternate to recommended method. NGM

Wines

717
Munoz (E) and Ingledew (WM). **Effect of yeast hulls of stuck and sluggish wine fermentation.Importance of the lipid components.** *Applied and Environmental Microbiology* 55(6): 1989: 1560-1564

The effect of yeast hulls (yeast hosts) on sluggish or stuck white wine fermentations was studied. The enhancing effect on yeast growth and fermentation rate displayed by the hulls was shown to be similar to the effect provided by lipid extract from the same hulls. Unsaturated fatty acids and sterols were

incorporated into the yeast from lipid extracts during fermentation carried out under oxygen-limited conditions. Adsorption of toxic medium-chain fatty acid (decanoic acid) onto the yeast hulls took place through a dialysis membrane. However, when the hulls were placed inside a dialysis bag, the increase in yeast growth and fermentation rate seen when freely suspended hulls were used did not occur. Accordingly, the effect of yeast hulls in preventing stuck fermentations cannot be attributed only to the adsorption and consequent removal of meidum-chain fatty acids from the juice. AS

Non-alcoholic beverages

Coffee

718

Scholtz (BM) and Maier (HG). **Isomers of quinic acid and quinide in roasted coffee.** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 190(2): 1990: 132-134

Using a GC/MS and a GC/FID system, six isomers of quinic acid and four quinides have been detected and quantified in roasted coffee on an OV-1 capillary column. Five of the quinic acids and three of the quinides have been discovered in roasted coffee for the first time. The identities of (plus or minus) epi- and scyllo-quinic acid as well as (plus or minus) epi-quinide have been confirmed. AS

719

Sanders (T). **Coffee and cholesterol.** *Chemistry and Industry* (5): 1990: 122

Recent research linking coffee consumption with coronary heart disease is discussed. SRA

Fruit juices

720

Arvanitoyannis (I). **The effect of storage of canned juices on content of the metals Fe, Cu, Zn, Pb, Sn, Al, Cd, Sb, and Ni.** *Die Nahrung* 34(2): 1990: 141-145

The canned juices of peaches, pears, apples and apricots stored over a 2 yrs time showed a considerable increase in concn. of Fe, Cu, Pb, Zn and Sn, while the change in Al, Cd, Ni and Sb is negligible. BV

Grapefruit juices

721

Tsen (H-Y) and Yu (G-K). **Limonin and naringin removal from grapefruit juice with naringinase entrapped in cellulose triacetate fibers.** *Journal of Food Science* 56(1): 1991: 31-34

Naringin and limonin are two bitter components of some citrus products such as grapefruit juice. Naringin could be removed by hydrolysis with immobilized naringinase and limonin might be removed by adsorption with cellulose monoacetate gel beads. Cellulose triacetate fibers show a similar limonin adsorption capacity as cellulose monoacetate gel beads. Thus when naringinase from *Penicillium* sp. was entrapped in such fibers, an enzyme column was made which could remove both bitter components simultaneously. When grapefruit juice was debittered with this enzyme column, sugar components, total organic acids and turbidity were not affected. The enzyme column could be regenerated by washing with warm water. In addition, operational stability of the enzyme column was satisfactory. Such enzyme column could be considered for industrial use. AS

Orange juices

722

Lum (OL), Wong (MK) and Lee (CK). **A simple headspace-gas chromatographic method for the quantitative determination of organic volatiles of fresh orange juice.** *Food Chemistry* 37(3): 1990: 313-317

A fast quantitative method of detn. of acetaldehyde, ethyl acetate, methanol and ethanol, in freshly squeezed Valencia orange juice using headspace-gas chromatography was developed. Filtered and unfiltered juices could be analysed using standard addition and direct calibration methods. AS

Satsuma mandarin juices

723

Ogawa (H), Fukuhisa (K), Fukumoto (H) and Fukutani (K). **Changes in soluble hesperidin content in clarified satsuma mandarin juice.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 37(3): 1990: 214-219 (Ja)

Tea

724

Opie (SC), Robertson (A) and Clifford (MN). **Black tea thearubigins-their HPLC separation and preparations during *in vitro* oxidation.** *Journal of the Science of Food and Agriculture* 50(4): 1990:

547-561

A reverse phase, gradient elution HPLC method has been developed to separate black tea thearubigin compounds. Using diode array spectroscopy, spectral data are provided for the major pigment peaks. The analytical method has been used to monitor the formation of the thearubigin compounds during black tea fermentation. *In vitro* model fermentation systems using partially purified tea polyphenoloxidase and mixtures of 6 pure catechins have also been analysed. Data are presented to relate many of the thearubigins in black tea liquors to their catechin precursors. Manipulation of the *in vitro* model system conditions will be used to prepare various thearubigins for further structural studies. AS

725

Stephen Thanaraj (QNS) and Seshadri (R). **Influence of polyphenol oxidase activity and polyphenol content of tea shoot on quality of black tea.** *Journal of the Science of Food and Agriculture* 51(1): 1990; 57-59

Variation in polyphenol oxidase activity and levels of total polyphenols and catechins with respect to different clones and shoot components, and its effect on quality of black tea (*Camellia sinensis* (L) O Kuntze) were studied. There was a wide variation in polyphenol oxidase activity of the different clones tested. The optimum fermentation time and polyphenol oxidase activity of different clones exhibited a hyperbolic relationship, viz y = 2.36 + 1129/x, where y = optimum fermentation time in minutes and x = polyphenol oxidase activity in MUM catechol oxidised g^{-1} acetone powder min^{-1}, with an r value of -0.98, which is significant P less than or equal to 0.001. A good non-linear relationship was found between polyphenol oxidase activity of fresh tea shoots of different clones the theaflavins content of corresponding black teas. Among different shoot components, bud and first leaf had higher levels of polyphenols and catechins than internodes. However, the polyphenol oxidase activity showed a reverse trend: the internodes exhibited a higher enzyme activity compared with other components. Formation of theaflavins during fermentation of different shoot components was in good agreement with polyphenol oxidase activity. High performance liquid chromatographic analysis of the theaflavins fraction in tea brew of black teas made from different components of tea shoot showed that buds results in black tea with the highest amount of theaflavin gallates, whereas teas produced from internodes had the lowest amount of theaflavin gallates. A new factor, viz theaflavin digallate equivalent, was developed, and the significance of this factor for chemical evaluation of black tea quality is discussed in this paper. AS

726

Natesan (S) and Ranganathan (V). **Content of various elements in different parts of the tea plant and in infusions of black tea from Sothern India.** *Journal of the Science of Food and Agriculture* 51(1): 1990; 125-129

Contents of various elements in different parts of the tea plant (shoot mature leaf, small stem, thick wood and root), black tea manufactured by the crush-tear-curl and orthodox processes, and tea brew after 1 and 5 min. of infusion were determined by inductively coupled plasma atomic emission spectrometry. From these the amount of each element assimilated in the production of 1000 kg of marketable tea, as well as the quantity of each element brought into infusion and thus possibly taken up through drinking tea, were calculated and discussed. Among the various elements assimilated by the tea plant, the shoot fraction (economically important for manufacturing commercial tea) contained high concn. of N, P, K and Mg while the mature leaf accumulated Al, Ba, Ca, Cd, Mn, Pb, and Sr. Of the different elements brough into infusion while brewing black tea, the amount of K was found to be the largest (10 000 MUg g_{-1} tea) followed by P (700-1200 MUg g^{-1}). Mg (300 700 MUg g^{-1}). Ca and Al (each 150 300 MUg g^{-1}). Mn (60 150 MUg g^{-1}). Cu, Na, Si and Zn (each 6-50 MUg g^{-1}). B, Ba, Cr, Fe, Ni and POb (each 1-6 MUg g^{-1}), and Sr, Co and Cd (each MUg g^{-1}). The proportion of the total amount of an element brought into infusion showed that the elements Ba, Ca, Fe and Sr were less soluble (10% of total amount), Al, B, Cd, Co, Cr, Cu, Mg, Mn, P, Pb, Si, and Zn were moderately soluble (10-50%). K, Na and Ni were highly soluble (50%). The overall mean of the extent of solubility of all elements in 1 and 5 min. showed that, out of the amount soluble in 5 min., about 68% was dissolved with in 1 min. AS

FATS AND OILS

727

Sattur (AP) and Karanth (NG). **Production of microbial lipids. I. Development of a mathematical model.** *Biotechnology and Bioengineering* 34(6): 1989; 863-867

728

Sattur (AP) and Karanth (NG). **Production of microbial lipids. II. Influence of C/N ratio - model prediction.** *Biotechnology and Bioengineering* 34(6): 1989; 868-871

729

Sattur (AP) and Karanth (NG). **Production of microbial lipids. III. Influence of C/N**

ratio-experimental observations. *Biotechnology and Bioengineering* 34(6): 1989: 872-874

Oils

Rice bran oils

730
Ducret (A), Pina (M), Montet (D) and Graille (J). **The effect of rice bran oil oryzanols on enzymatic deacidification of hyperacid oils.** *Oleagineux* 45(3): 1990: 135-138 (Fr)

Deacidification by enzymatic re-esterification, developed on hydrolyzed oil models and then successfully applied to crude palm oil, is not directly applicable to rice bran oil, principally due to the oils's non-glycerided fraction. In particular, this fraction contains esters of ferrulic acid with triterpenic alcohols, called oryzanols, which are suspected of having the drawback of fixing themselves onto the resin used as the biocatalyst support. The effect of these <oryzanols> was studied using an acid oil model reconstituted by adding oryzanols, either in a natural form, in solution in their natural matrix, or in isolated form, added to the <non-saponifiable> fraction of rice bran oil. AS

Sesame oils

731
Yen (G-C). **Influence of seed roasting process on the changes in composition and quality of sesame** (*Sesame indicum*) **oil.** *Journal of the Science of Food and Agriculture* 50(4): 1990: 563-570

The comp. and quality changes of sesame oils prepared at different roasting temp. (180-260 C) from sesame seed were evaluated and compared with an unroasted oil sample. There were no apparent differences in characteristics, such as acid value, iodine value, saponification value and refractive index, of sesame oils prepared at a roasting temp. between 180 and 220 C. The colour units and total polar content of oils increased in relation to an increase in roasting temp. The phospholipid content was reduced from 690 mg kg^{-1} in unroasted oil to 0 mg kg^{-1} in the oil prepared using a 260 C roasting temp. The fatty acid content of the oil was reduced markedly, especially in oleic and linoleic acids, when the roasting temp. was over 220 C. The amounts of chlorophyll and sesamolin decreased with increasing roasting temp. However, the highest level of sesamol and γ-tocopherol was found in oils prepared with a 200-220 C roasting temp. The sesame oil prepared at a 200 C roasting temp. had the best flavour score when compared with the other samples. AS

732
Ishola (MM), Agbaji (EB) and Agbaji (AS). **A chemical study of** *Tamarindus indica* **(tsamiya) fruits grown in Nigeria.** *Journal of the Science of Food and Agriculture* 51(1): 1990: 141-143

The edible part (pulp) of *Tamarindus indica* L fruit is relatively poor in protein (87.9 g kg^{-1}) and oil (25.3 g kg^{-1}.) but the seed is a good source of both protein (269.3 g kg^{-1}) and lipid (109.1 g kg^{-1}) resp. Both the pulp and seed are good source of Ca, and the seed of P, Mg, and K. Low levels of phytic acid and heat-labile trypsin inhibitors are present. AS

Spices

733
Thomann (R). **Taste of fresh herbs the whole year.On the use of natural spice oils.** *Ernahrungsforschung* 34(6): 1989: 186-187 (De)

Oils obtained by steam distillation from fresh spice plants, seed and roots are highly taste-intensive and can be used for the aromatization of foods and dishes for a number of yrs. If the addition of solubility promoters is necessary oily or water solutions are used. Dosage is dependent on the final product (approx. 50 g/t). For this purpose oily premixes (0,02-2.0%) or prefabricated on industrial scale essences (1-2% liquid seasonings) are added. AS

734
Sjoberg (A-M), Manninen (M), Harmala (P) and Pinnioja (S). **Methods for detection of irradiation of spices.** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 190(2): 1990: 99-103

Three types of methods for the identification of irradiation of spices were tested as potential control methods. The methods were microbiological, combining a direct epifluorescent filter technique (DEFT) with a total aerobic plate count (APC), a chemiluminescence method and chem. gas-chromatographic (GC) and GC-MS methods for analysis of volatile oils of spice isolated by steam distillation. Twelve samples of spices (mainly pepper) were analysed before and after gamma-irradiation with doses of 10 and 50 kGy. The chemiluminescence measurements were performed before the irradiation and 10 and 100 days after the irradiation. The best methods for control purposes were the microbiological (DEFT + APC) methods combined with chemiluminescence measurements. No differences were detected

between the irradiated and non-irradiated samples with the chem. methods. AS

Dills

735

Blank (I) and Grosch (W). **Evaluation of potent odorants in dill seed and dill herb** (*Anethum graveolens L.*) **by aroma extract dilution analysis.** *Journal of Food Science* 56(1): 1991: 63-67

The volatile components of dill seed and herb were analysed by gas chromatography-olfactometry which revealed the odorants having highest odor-activity value (ratio of concn. to odor threshold). (+)-(4S)-Carvone was the predominent odorant of dill seed. (+)-(3R,4S,8S)-3,9 -Epoxy-1-p-menthene, methyl 2-methylbutanoate, (+)-(4S)-α-phellandrene and myristicin were the most important odorants of dill herb. Calculation of odor-activity values on the basis of quantitative and odor threshold data confirmed results of the aroma extract dilution analysis. AS

Pepper

736

Narasimhan (S), Chand (N), Rajalakshmi (D) and Indiramma (AR). **Quality of powdered black pepper** (*Piper nigrum* L) **during storage. I. Sensory and physicochemical analyses.** *Journal of Sensory Studies* 4(4): 1990: 229-240

Black pepper powder (60 mesh) was stored in consumer unit packs of 100g capacity in low density polyethylene (LDPE) films of 100, 300, and 500 gauge at 27 C and 65% RH. Analyses for sensory quality (odour, and flavour), volatile oil, oleoresin, piperine content, and TLC were carried out at 15, 30, 45 and 80 days of storage. Significant loss of "top notes", volatile oil, and hydrocarbons were seen after 15 days of storage itself while the "basic notes" and oxygenated compounds were retained up to 45 days. There was no loss of piperine up to the end of the study. The black pepper powder was not fit for table use after 15 days, though it could be used for other culinary purposes up to 80 days of storage. AS

SENSORY EVALUATION

737

Rohler (R), Raeubuer (H-J) and Balzer (M). **The mechanical step-function response for recording of rheological changes of foodstuffs.** *Lebensmittelindustrie* 36(3): 1989: 104-107 (De)

A measuring method has been developed by reception and evaluation of the step-function response. It can be used to record rheologic changes of the measuring medium during food-technological processes in non-destructive way and very short measuring time. First exp. with this measuring method for the measuring of the carbonizing state were successful. It is unable for visco-elastic foodstuffs, especially. Possible fields of application are the examination of the carbonizing process, the maturing of cheese, the thawing of deep-frozen foodstuffs and the baking process. AS

738

Vie (A), Gulli (D) and O'Mahony (M). **Alternative hedonic measures.** *Journal of Food Science* 56(1): 1991: 1-5, 46

Simple ranking and rating procedures for hedonic testing were developed from which signal detection analysis gave simple probability values indicating preference. Data were pooled over judges to give preference scores for specific groups of consumers. Rating was preferable when forced choice was to be avoided and ranking was preferable when response bias was a consideration. The rating procedure was less prone to instructional bias than the 9-point hedonic scale. Ranking methods were extended to measure 'likelihood to buy', when price was included in the decision, as well as degree of preference. AS

FOOD STORAGE

739

Becker (E). **Reflection on the installation of a new storage system.** *Fluessiges Obst* 55(9): 1988: 494-496 (De)

740

Pai (TK) and Sastry (SK). **Effect of storage conditions on colour change of selected perishables.** *International Journal of Refrigeration* 13(3): 1990: 197-202

The effects of refrigerated storage temp. and relative humidity (RH) on the colour change of mature green tomato ('Dombito'), mushroom (sylvan hybrid white) and apple ('Red Delicious') were investigated at 3 temp. (5, 10 and 15 C) and 4 different relative humidity levels (91, 94, 97 and 100%). Colour change rates of the tomatoes (a values) showed an apparent zero-order reaction with an activation energy (E_a) of 45.15 kcal mol^{-1}. The rates of loss of whiteness of mushrooms was not significantly affected (P greater than 0.01) by RH ranges at the same temp. The loss of whiteness of mushroom showed an apparent first-order reaction, with an activation energy of 20.48 Kcal mol^{-1}. The colour change rates of apples showed decreasing slopes, but the results were generally not clear, due to the

relatively short duration of storage. AS

INFESTATION CONTROL AND PESTICIDES

Pesticides

741
Hirashima (A), Ueno (R), Oyama (K), Ishaaya (I) and Eto (M). **Effect of five-membered cyclic phosphorothionates on larval growth, trehalase, digestive enzymes, acetylcholinesterase, and cyclic adenosine 3'5'-monophosphate level of** *Tribolium castaneum* and *Musca domestica*. *Pesticide Biochemistry and Physiology* 35(2): 1989: 127-137

The 4-isobutyl (iBMOS) and 5-phenyl (5-PMOS) derivatives of 1,3,2-oxazaphospholidine 2-sulphide suppressed the larval growth, pupation, and emergence of *Tribolium castaneum* and *Musca domestica*. Feeding larvae iBMOS or 5-PMOS for 2 days reduced wt. gain, suppressed soluble gut trehalase activity, and increased whole body levels of cyclic adenosine 3'5'-monophosphate (cAMP) relative to control. Invertase was slightly suppressed and neither amylase nor protease was affected *in vivo* by these phosphorus compounds. At a concn. of 10^{-4} M, iBMOS and 5-PMOS had no direct effect on these enzymes *in vitro*. At a dose needed for 50% mortality (LD^{50}) 20 h after topical application, 5-PMOS caused a 50% inhibition of *M. domestica* adult females acetylcholinesterase activity (AChE), 60 min after topical application. *T. castaneum* larvae fed for 24 h on a diet containing 80 to 320 p.p.m. iBMOS underwent AChE inhibition of 61 to 86%; cAMP content was increased up to 186% and mortality up to 34%, relative to control. Similar phenomena were observed with 80 to 230 p.p.m. of 5-PMOS. It can be concluded that at sublethal concn., these compounds reduced trehalase activity, which is important for energy supply in insects, whereas at lethal concn. they inhibited AChE activity similar to other acyclic phosphorus compounds. AS

BIOCHEMISTRY AND NUTRITION

742
Antonov (YA) and Tolstoguzov (VB). **Food protein from green plant leaves.** *Die Nahrung* 34(2): 1990: 125-134

The paper is concerned with the isolation of food protein from clover and lucerne leaves in a soluble nondenaturated state. The protein conc. are white or light-cream-coloured and contain 74 and 82% of protein, 11.5 and 7.9% of carbohydrates, and 800 and 1000 mg Ca/kg, resp. The concn. are water-soluble at pH over 6.0 and include fractions 1 and 2 of leaf protein. The content of essential amino acids in the clover and lucerne proteins is 42-43% and the protein *in vitro* digestibility is as high as 90% relative to the major milk-casein one. AS

Biochemistry

743
Buhrdel (P), Bohme (H-J) and Didt (L). **Dietetic treatment of children suffering from glycogenoisis type 1.** *Ernahrungsforschung* 34(6): 1989: 182-185 (De)

In patients with glycogenoisis type 1 60-70% of daily food energy intake has to be supplied with carbohydrates. To avoid hypoglycaemia during the first three or four yrs continuous intragastric infusion of glucose is administered over night. During the day every 2-3 h maltodextrin-enriched meals are fed. After the 4th yr of life the intragastric infusion of glucose over night can be substituted by 1-2 meals containing uncooked starch. The supply of polyunsaturated fatty acids with the food is of particular importance. As a result of carrying out the therapy precisely secondary disturbed biochemical characteristics improve. Normalization of growth speed as well as reduction of liver mass can be expected. AS

744
Elizalde (BE), Giaccaglia (D), Pilosof (AMR) and Bartholomai (GB). **Kinetics of liquid drainage from protein-stabilized foams.** *Journal of Food Science* 56(1): 1991: 24-26, 30

Drainage of 14 protein-stabilized foams was determined as a function of time. Drainage conformed to the empirical equation $v = Vt/(B + t)$, where v is the vol. of drained liquid at time t, V is the max. drained vol., and B is the time needed to drain V/2. Rate constants and initial rates of drainage could be calculated from parameters V and B. However, B would be the preferred index of foam stability as it was not influenced by the initial volume of liquid in the foam. AS

745
Elizalde (BE), Pilosof (AMR) and Bartholomai (GB). **Prediction of emulsion instability from emulsion composition and physicochemical properties of proteins.** *Journal of Food Science* 56(1): 1991: 116-120

Emulsion instability at 37, 45 and 60 C of soy protein-stabilized emulsions of variable protein-oil concn. were systematically investigated. A regression model for prediction of emulsion

instability was derived. The variables were functions of the relationship between the water and oil absorbed by the protein and total water and oil in the emulsion. The regression model derived for soy protein stabilized emulsions was suitable for predicting emulsion instability of many other protein stabilized emulsions. Knowledge of water-and-oil-absorption capacity of the protein and comp. of the emulsion would allow a rapid prediction of emulsion instability. AS

746

Velisek (J), Davidek (T), Davidek (J) and Hamburg (A). **3-Chloro-1,2-propanediol derived amino alcohol in protein hydrolysates.** *Journal of Food Science* 56(1): 1991: 136-138

In model aqueous solutions containing 3-chloro-1,2-propanediol (arising by the interaction of hydrochloric acid with lipids in protein hydrolysate and ammonia, 3-amino-1,2-propanediol was found as the main reaction product together with smaller amounts of glycerol. The reaction mechanism of formation of these two compounds was outlined and discussed as well as the possibilities of formation of some other amino analogues of glycerol chlorohydrins. 3-Amino-1,2-propanediol was also identified in commercially available seasonings (hydrolyzed vegetable protein) being present in concn. of 30 $mg.kg^{-1}$. AS

747

Velisek (J), Davidek (T), Davidek (J), Kubelka (V) and Viden (I). **3-Chloro-1,2-propanediol derived amino acids in protein hydrolysates.** *Journal of Food Science* 56(1): 1991: 139-142

TOXICOLOGY

748

Maekawa (A), Todate (A), Ondera (H), Matsushima (Y), Nagaoka (T), Shibutani (M), Pgasawara (H), Kodama (Y), Hayashi (Y). **Lack of toxicity/carcinogenicity of monosodium succinate in F334 rats.** *Food and Chemical Toxicology* 28(4): 1990: 235-241

The toxicity/carcinogenicity of monosodium succinate, a food additive, was examined in F344 rats. The oral LD_{50} was 80 g/kg body wt. In a 13-2k subchronic oral toxicity study, the only toxicological findings was suppression of body-wt. gain in groups given greater than or equal to 2.5% monosodium succinate in the drinking-water. Histological examination revealed no toxic lesions specifically caused by the compound in any organs of any of the treated rats. The max. tolerated dose was detn. to be 2-2.5% on the basis by body-wt. depression. In a long-term (2-yr) toxicity/carcinogenicity study monosodium succinate was given ad lib. in drinking water (distilled water) at levels of 0, 1 or 2% to groups of 50 male and 50 female rats. No toxic lesion specifically caused by long-term administration of monosodium succinate was detected. No dose-related increase was found in the incidences of tumours in any organ or tissue except for C-cell tumours of the thyroid gland of females. The incidence of these tumours in females given the 2% dose was higher than that in controls but not significantly so, and a positive trend for this tumour was noted in females. C-Cell tumour is one of the most commonly observed spontaneous tumours in ageing female rats of this strain and occurs at a variable incidence. There was no difference between the female control and treated groups in the incidence of preneoplastic change of the thyroid gland. Furthermore, the incidence of C-cell tumours in the female control group was lower high-dose group and the detection of a positive trend of this tumour in females were probably a function of experimental variability and were not related to treatment. The results indicate that monosodium succinate had neither toxic nor carcinogenic activity in F344 rats when it was given continuously at levels or 1 or 2% in the drinking-water for 2 yr. AS

749

Munzner (R), Guigas (C) and Renner (HW). **Re-examination of potassium sorbate and sodium sorbate for possible genotoxic potential.** *Food and Chemical Toxicology* 28(6): 1990: 397-401

Potassium sorbate and sodium sorbate were investigated for possible genotoxic actions using the *Salmonella*/mammalian-microsome test, HGPRT and sister chromatid exchange (SCE) test with Chinese hamster ovary cells, the micronucleus test on bone marrow cells of mice and Chinese hamsters, and the chromosome aberration and SCE test on Chinese hamsters. In all the *in vitro* tests no signs of genotoxicity were detected. Whereas no *in vivo* mutagenicity of potassium sorbate and sodium sorbate with freshly prepared aqueous solutions and with stored potassium sorbate was found, investigations with stored sodium sorbate revealed weak clastogenic activity by increased chromosome aberrations and elevated numbers of micronuclei at doses of 200 mg/kg body wt., but no induction of SCEs. AS

Mycotoxins

Aflatoxins

750

Haydar (M), Benelli (L) and Brera (C). **Occurrence of**

aflatoxins in Syrian foods and foodstuffs. A preliminary study. *Food Chemistry* 37(4): 1990: 261-268

751

Reed (GHJr). **Guidelines for satisfactory food protection and sanitation practices.** *Dairy and Food Sanitation* 9(7): 1989: 365-368.

FOOD LAWS AND REGULATIONS

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